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POLYCRISIS RESILIENCE SERIES · RESEARCH REPORT

Polycrisis Resilience in the Global South

Reducing human and systemic vulnerability through development, technology diffusion, and integrated risk reduction



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THE FRAMEWORK AT A GLANCE

THE DEFINITION

Polycrisis Resilience is the capacity of individuals, communities, institutions, economies, societies and interconnected systems to anticipate, withstand, adapt to, recover from and reduce their vulnerability to multiple interacting crises.

SIX DEVELOPMENT PRIORITIES

- **Clean energy** and technological convergence
- **Climate adaptation** and infrastructure resilience
- **Clean industrialization** and economic development
- **Human development** and environmental health
- **Technology diffusion** and digital connectivity
- **Institutional** and adaptive capacity

FIVE-STAGE CYCLE

1. Identify vulnerability
2. Prioritise development interventions
3. Strengthen interconnected systems
4. Reduce systemic vulnerability
5. Strengthen long-term resilience

Continuous assessment, learning and improvement

EXECUTIVE SUMMARY

Executive Summary

The severity of the coming polycrisis in the Global South depends not only on the threats themselves but on how vulnerable the people and systems exposed to them are. That vulnerability can be reduced, and most of the tools for doing so are development tools.

The Global South is where the twenty-first century's interconnected risks will be felt most. The 131 low- and middle-income economies analysed here hold 6.7 billion people, 83% of humanity, and the United Nations expects that number to reach 8.8 billion by 2100. Climate change, polluted air, poverty, weak infrastructure, population pressure, energy shortages, health gaps and political instability all bear on the same societies at the same time, and they reinforce one another. This report asks what Polycrisis Resilience, the idea that reducing underlying vulnerability is as important as reducing individual threats, means in practice across Africa, South Asia, Southeast Asia, Latin America and the small island states.

2.0 bn
people in the Global South still cook with polluting fuels, and almost none outside it do

1.4 bn
people live in the 41 countries that are in the world's worst fifth on four or more of seven challenges

300 m
fewer child deaths in 2025–2100 if progress matched the best peers rather than stalling

8.8 bn
Global South population projected for 2100 (UN medium variant), up from 6.7 billion today

Principal findings

- **Vulnerability, not only hazard, sets the outcome.** Across the Global South, the services that protect people (electricity, clean cooking, sanitation, health care) are strongly tied to national income, with correlations of 0.73 to 0.85, while exposure to hazards such as air pollution is barely related to income at all (Figure 6). Threats arrive regardless; vulnerability is what development can change.
- **Progress since 2000 has been large.** Electricity access rose from 73% to 90%, clean cooking from 36% to 70%, sanitation from 45% to 79%, internet use from 1% to 67%, and under-five mortality fell from 69 to 29 per 1,000 births (World Bank, 2026). The gaps with high-income countries are still large: 6 times higher child mortality and 2.9 times more polluted air.
- **The burden is concentrated.** Sub-Saharan Africa holds 88% of the Global South's people without electricity and half of those without clean cooking; South Asia holds most of the rest of the cooking gap and the most polluted air. On seven challenges, 41 countries, 1.4 billion people, are in the worst fifth on four or more, and 82% of Africans live in such countries (Section 2).
- **Six development priorities work on several vulnerabilities at once.** Clean energy, climate adaptation, clean industrialization, human development and environmental health, technolo-

gy diffusion, and institutional capacity form one mutually reinforcing strategy rather than six separate programmes (Section 4).

- **Regions need different mixes.** The same framework points to electricity and clean cooking in Sub-Saharan Africa, heat and air quality in South Asia, coasts and industry in Southeast Asia, inequality and urban infrastructure in Latin America, and coastal adaptation and resilient power in the small island states (Section 5).
- **The century-long gap between paths is large.** At today's pace 1.7 billion people would still lack clean cooking in 2100; at the pace the best-performing tenth of comparable countries has shown, the number would be 84 million. Cumulative child deaths in 2025–2100 would be about 209 million at current pace and 92 million at best-peer pace (Section 6).
- **Prevention is usually cheaper than response, but not guaranteed to pay everywhere.** Benefit-cost ratios of 2:1 to more than 10:1 are reported for adaptation and resilient infrastructure (Global Commission on Adaptation, 2019; Hallegatte et al., 2019). Each claim still has to be tested country by country (Section 7).
- **Progress can be measured.** A dashboard of eight dimensions, with exposure, vulnerability and capacity kept separate, ranks regions in a stable order and points to the next step: a transparent Polycrisis Resilience Index (Section 8).

What this means for decision makers

Four ideas run through the report. First, **look at vulnerability as well as hazard**: it is where governments, funders and communities have the most leverage. Second, **favour multi-benefit investments**, such as clean power for clinics and clean cooking for homes, because each dollar then works against several risks. Third, **front-load foundations**: the early decades of the century decide how many people enter the later decades with strong or weak protection. Fourth, **measure honestly**: use public indicators, report ranges, and keep scenarios labelled as scenarios. Section 9 turns these ideas into ten priorities.

About the evidence

All numbers come from public sources: the World Bank's World Development Indicators and Worldwide Governance Indicators, the World Health Organization, the United Nations population projections and the INFORM Risk Index. The Global South is defined here as the 131 economies the World Bank classifies as low income (25), lower-middle income (47) or upper-middle income (59) (World Bank, 2025b). Regional groups are the author's. Scenarios are arithmetic projections of stated paces, not forecasts, and the report says so wherever they appear.

SECTION 01

The Global South as the Central Arena of Polycrisis Resilience

Over the coming decades, climate change, environmental damage, poverty, weak infrastructure and population pressure will meet in the same places. Those places are mostly in the Global South, and the outcome is not predetermined.

IN BRIEF

- The 131 economies analysed hold 6.7 billion people today and 8.8 billion by 2100.
- Seven overlapping vulnerabilities, from climate to institutions, interact and feed each other.
- Development pathways can change how exposed people are and how well societies cope.

1.1 Why the Global South

The Global South is not one place. It spans the Sahel and the Mekong delta, Andean cities and Pacific atolls, economies with a few hundred dollars of income per person and economies approaching rich-country levels. This report uses a simple and transparent definition, the 131 countries the World Bank classifies as low or middle income (World Bank, 2025b), which together contain 83% of the world's people.

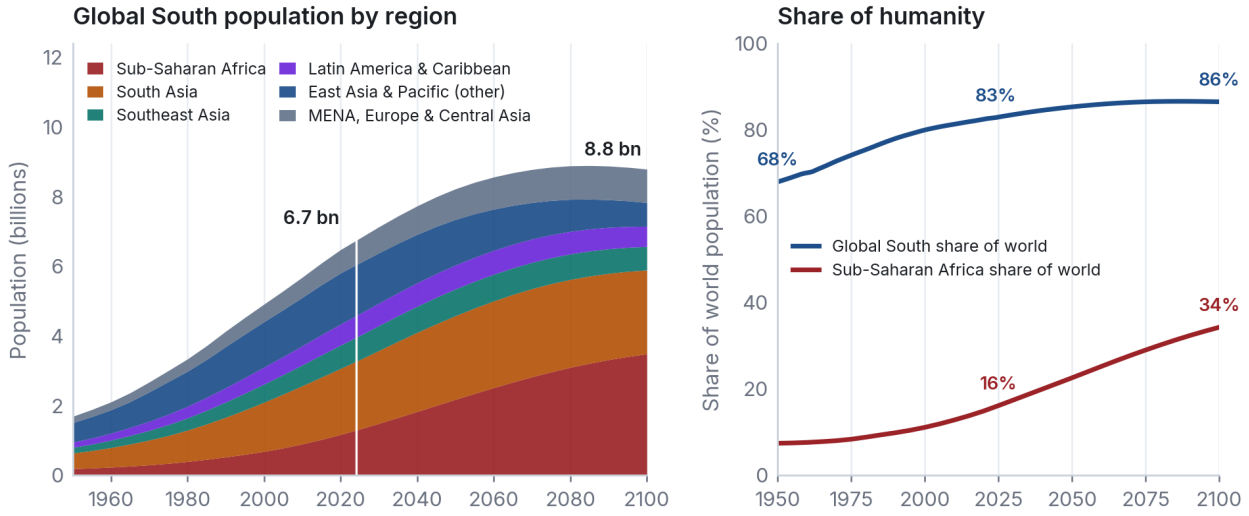
Three facts make the group central to any discussion of interconnected global risks. First, **people**: the United Nations projects the Global South to grow from 6.7 billion in 2024 to about 8.8 billion by 2070, and to hold 86% of humanity by 2100 (United Nations, 2024; Our World in Data, 2025). Second, **exposure**: 73% of Global South residents live in countries with high climate hazard scores and 52% in countries where air pollution or polluting cooking fuels place them in the worst fifth worldwide. Third, **need**: almost every person on Earth who lacks electricity, clean cooking fuel, basic drinking water or basic sanitation lives here (Figure 3).

1.2 Seven overlapping vulnerabilities

Many developing economies face overlapping constraints that can amplify the effects of interconnected crises. This report groups them into seven, and uses the same seven to organise its evidence.

Figure 1 **Humanity's growth over the rest of the century is overwhelmingly in the Global South, and above all in Sub-Saharan Africa**

Left: population by region (billions). Right: share of world population (%), 1950–2100



Source: United Nations World Population Prospects 2024, medium variant, via Our World in Data (United Nations, 2024; Our World in Data, 2025). Groups defined in the text. Calculations by H Heuristics.

Table 1 **Seven vulnerabilities that overlap across the Global South**

Vulnerability	What it includes	How it is measured here
Climate	Extreme heat, flooding, drought, coastal exposure, changing rainfall and farm disruption	INFORM climate hazard score (European Commission JRC, 2026)
Environmental health	Air pollution, unsafe water, poor sanitation, industrial contamination, household exposure to polluting fuels	PM2.5; clean cooking access
Economic	Poverty, thin public finances, debt, unemployment, dependence on climate-sensitive sectors	GDP per person; extreme poverty (World Bank, 2026)
Infrastructure	Unreliable power, weak transport, poor housing, limited health facilities, water insecurity	Electricity, water, sanitation, internet access
Demographic	Rapid urbanization and population growth that raise demand for food, housing, energy, schools and jobs	UN projections (United Nations, 2024)
Institutional	Limited administrative resources, fragmented implementation, weak coordination across crises	Government effectiveness (World Bank, 2025a)
Geopolitical and social	Conflict, displacement, resource competition, disrupted trade and essential services	Political stability (World Bank, 2025a)

Source: H Heuristics, from Hughes (2026a). Indicators are the measures used in the report's calculations.

1.3 Why interconnection matters

The importance of these challenges lies partly in how they connect. Extreme heat raises electricity demand while it cuts labour productivity. Electricity shortages weaken health care, water distribution and industry. Poverty limits what a household can do to protect itself from environmental hazards, while environmental damage in turn undermines economic development. Researchers who study these patterns call the result a *polycrisis*, a situation in which crises interact

so that the whole is more damaging than the sum of its parts (Lawrence et al., 2024; Lawrence et al., 2022).

Three kinds of link recur: **common causes**, where one underlying weakness such as low income drives several problems; **domino effects**, where one crisis triggers another, as when a drought leads to higher food prices and then to unrest; and **feedback loops**, where problems feed each other, as when illness deepens poverty and poverty prevents treatment. These feedbacks can leave persistent vulnerability even after an individual crisis has been addressed.

Polycrisis Resilience

Polycrisis Resilience is the capacity of individuals, communities, institutions, economies, societies, and interconnected systems to anticipate, withstand, adapt to, recover from, and reduce their vulnerability to multiple interacting crises.

General definition. A concept developed by Hunter Hughes, Founder of H Heuristics (Hughes, 2026a).

1.4 The central proposition

THESIS

Central proposition

The future severity of global polycrisis is not determined exclusively by the threats themselves, but also by the vulnerability of the populations and systems exposed to them. Improving those underlying conditions represents an important opportunity for long-term intervention.

It does not say that threats are unimportant: warming, pollution and conflict are real and must be addressed at their source. It says that a given threat does not produce a given outcome. A flood, a heatwave or a pandemic kills far fewer people where homes are sound, power and clinics work, warnings arrive and families have savings and insurance. Research on disasters has long shown this: richer countries do not suffer fewer natural hazards, but they suffer far fewer deaths from them (Kahn, 2005; Toya and Skidmore, 2007), and vulnerability to floods, droughts and storms has fallen over time, fastest where incomes grew (Formetta and Feyen, 2019; Jongman et al., 2015). The claim has limits: it does **not** say that development automatically reduces vulnerability, that all interventions are equally effective or that the scenarios later in the report are predictions. Where evidence is mixed, the text says so; air pollution is the clearest example (Section 3).

1.5 Vulnerability is not responsibility

Calling the Global South the central arena does not mean it is the main cause. The 131 economies together account for about 63% of fossil-fuel CO_2, but that share is dominated by China and India; per person the Global South emits 3.5 tonnes a year against 9.9 in high-income countries, and Sub-Saharan Africa and the small island states together emit about 2.6% of the world total (Our World in Data, 2025a). The report's focus is where risks will be felt and where investment in resilience can do the most good, not who is to blame.

SECTION 02

Where the Burden Falls: The Evidence Base

Progress since 2000 has been large, yet the remaining gaps are concentrated in a small number of regions, and the overlapping of challenges is the defining feature of the hardest-hit countries.

IN BRIEF

- Under-five mortality fell from 69 to 29 per 1,000 births since 2000, and extreme poverty from 45% to 12%.
- 88% of people without electricity and 50% of those without clean cooking are in Sub-Saharan Africa.
- 41 countries with 1.4 billion people are in the worst fifth on four or more of seven challenges.

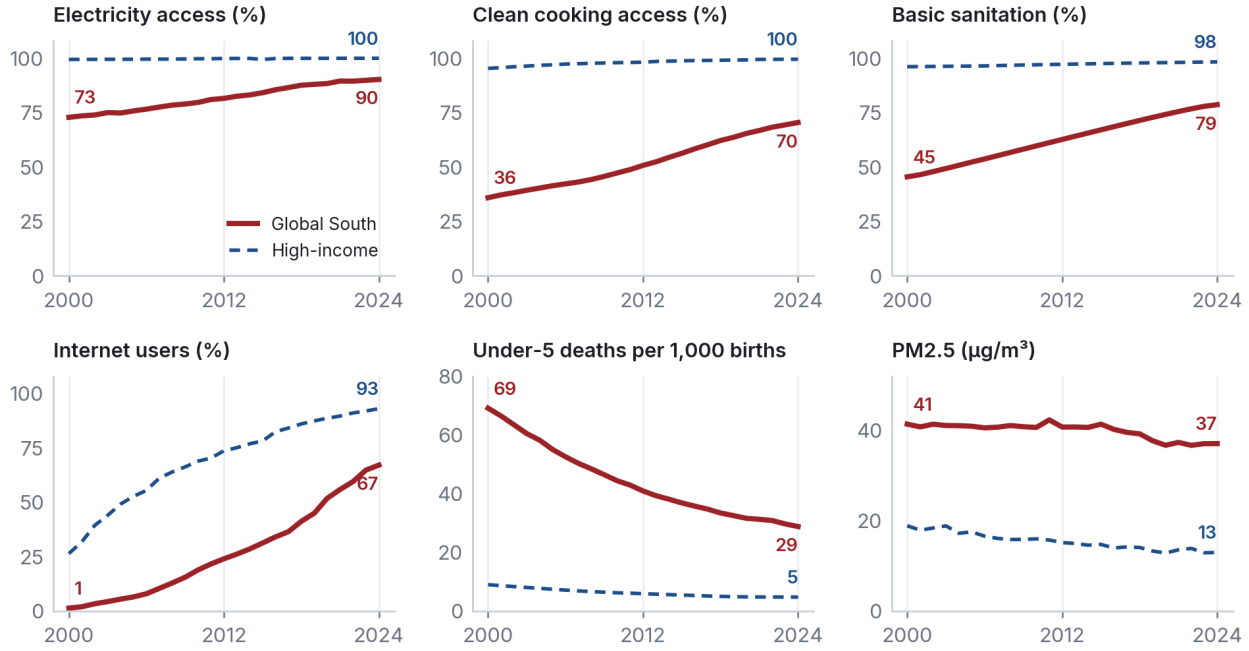
2.1 The long climb since 2000

Before describing what is left to do, it is worth recording how much has been done. Figure 2 compares the Global South with high-income countries since 2000. Every indicator has moved in the right direction. The share of people with electricity rose by 17 points, with clean cooking by 35 points and with basic sanitation by 33 points, and internet use went from almost nothing to two people in three. Child mortality more than halved: an estimated 10.2 million children under five died in these countries in 2000 against 4.9 million in 2024, even though the number of births remained high. Air quality is the exception: average exposure to fine particles (PM2.5) fell only from 41 to 37 micrograms per cubic metre, nearly three times the level in rich countries (World Bank, 2026).

These gains are the best argument for the central proposition: they show that vulnerability can be reduced on a very large scale, in a few decades, by countries that were poor at the start. They also show what progress does not do automatically. Rising incomes and new infrastructure drove the improvements in electricity, sanitation and child survival. Clean air did not follow in the same way, for reasons taken up in Section 3.

Figure 2 **Basic services and survival improved steadily after 2000, but air quality barely moved and gaps with rich countries remain wide**

Selected indicators, 2000–2024



Source: World Bank World Development Indicators (World Bank, 2026). Population-weighted averages for 131 low- and middle-income economies and 86 high-income economies. Calculations by H Heuristics.

2.2 Who is still without basic services

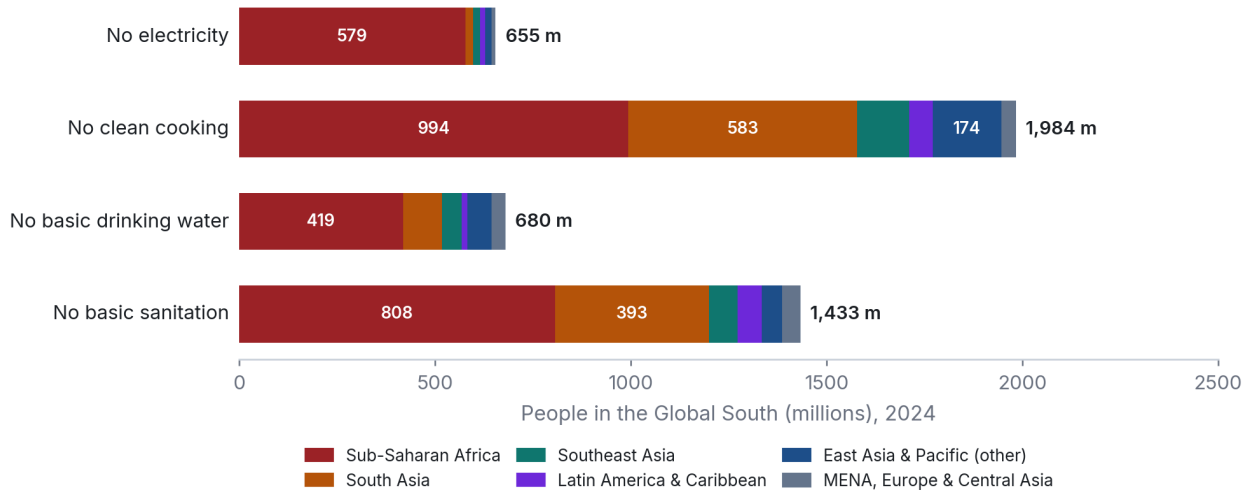
The remaining gaps are large in absolute terms and concentrated in a few regions (Figure 3). About 655 million people still lack electricity, 1,984 million lack clean cooking, 680 million lack basic drinking water and 1,433 million lack basic sanitation. Sub-Saharan Africa accounts for 88% of the electricity gap, 62% of the drinking water gap, 56% of the sanitation gap and 50% of the cooking gap. South Asia has the second largest share of the cooking and sanitation gaps, with 583 million and 393 million people. Although the totals have fallen since 2000 (the number without clean cooking fell from 3.1 billion to 2.0 billion), the pace of improvement differs sharply across regions, and Africa's rapid population growth means its number of people without clean cooking has not fallen (IEA et al., 2025; Hughes, 2026b).

2.3 Seven challenges, one map

To see where challenges pile up, the report asks, for each of 217 economies, whether it is in the world's **worst fifth** on each of seven measures: climate hazard, air pollution (or polluting cooking), poverty, food and water, child health, energy access and political stability. Figure 4 shows the share of people in each region who live in a country that falls in the worst fifth on each challenge. The pattern is sharp. In Sub-Saharan Africa the energy, food and water, and child-health flags apply to 90%, 89% and 78% of the population, and almost nowhere else. South Asia is flagged mainly for air pollution, climate hazard and political stability. East Asia and Southeast Asia are flagged for climate hazard, not for deprivation. The small island states stand out for being flagged moderately on *everything*, a reminder that small size and remoteness raise costs across the board.

Figure 3 Sub-Saharan Africa and South Asia together hold most of the world's unmet basic needs

People without each service, by region (millions), 2024



Source: World Bank World Development Indicators (World Bank, 2026), latest available year (mostly 2022–2024), multiplied by population. Small island states overlap with the regional groups and are not shown separately.

Figure 4 Deprivation challenges cluster in Sub-Saharan Africa; hazard and pollution challenges are widespread in Asia

Share of people living in countries in the world's worst fifth on each challenge (%)

	Climate hazard	Air pollution	Poverty	Food and water	Child health	Energy access	Political instability
Sub-Saharan Africa	27	80	60	89	78	90	71
South Asia	95	100	4	2	15	0	97
Southeast Asia	94	9	0	0	0	0	25
Latin America & Caribbean	50	2	2	4	2	2	15
East Asia & Pacific (other)	99	3	1	3	1	3	0
MENA, Europe & Central Asia	43	51	6	11	0	1	62
Small island dev. states	58	48	48	44	44	42	20
Global South	73	52	14	20	20	18	53
High-income	51	4	0	0	0	0	11

Source: H Heuristics calculations from World Bank (World Bank, 2026; World Bank, 2025a) and INFORM (European Commission JRC, 2026). A country is flagged when it is in the worst fifth of 217 economies on that measure; cells show the share of regional population in flagged countries.

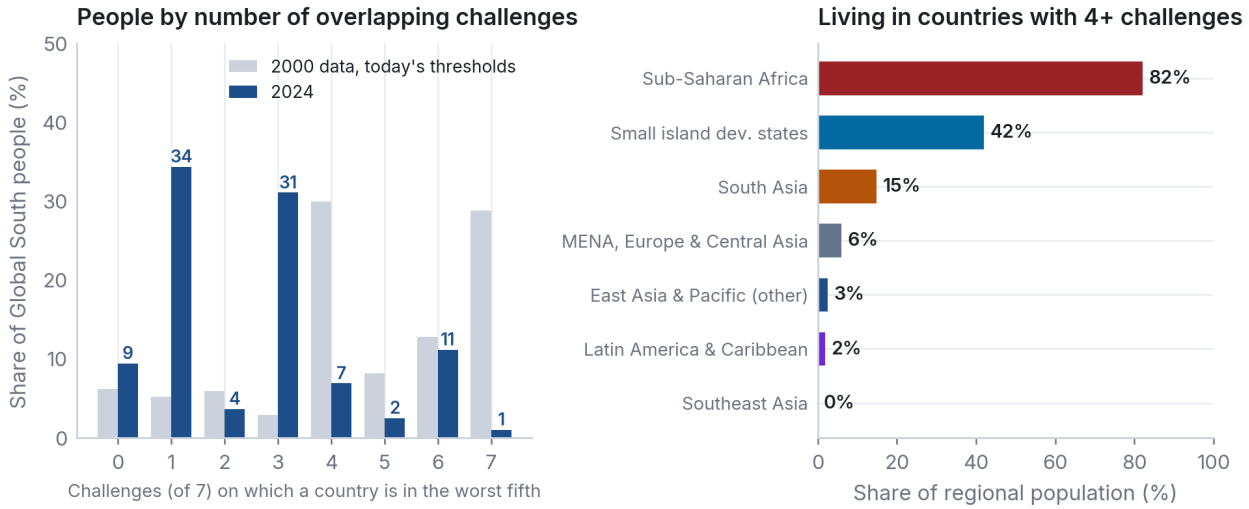
2.4 When challenges stack up

Counting how many challenges a country faces at once gives a simple measure of overlap. In 2024 only 9% of Global South residents lived in countries with none of the seven flags; 56% lived in countries with two or more, and 21% in countries with four or more, a group of 41 countries holding 1.4 billion people (Figure 5). Three countries, Haiti, Mozambique and Somalia, are in the worst fifth on all seven. No high-income country has more than two flags. The overlap is stronger than chance would produce: if the seven flags were scattered at random with the same frequency, about 16% of countries would have four or more, but 31% do.

Stacking is closely tied to income. Of the 25 low-income countries, 24 have four or more flags; of 47 lower-middle-income countries, 16; and of 59 upper-middle-income countries, 1. By region, 82% of Sub-Saharan Africans, 42% of people in the small island states and 15% of South Asians live in such countries. There is good news in the comparison with the past. Applying today's worst-fifth lines to year-2000 data, about 80% of the Global South's people lived in countries with four or more flags; the share has now fallen to 21%, mainly because large countries such as India, China, Indonesia and Bangladesh moved out of the group. Overlap can fall, and has.

Figure 5 Most Global South residents live in countries with few overlapping challenges, but a distinct group has many, mostly in Sub-Saharan Africa

Left: distribution of Global South people by number of challenges. Right: share of each region's people in countries with four or more



Source: H Heuristics calculations. Seven challenges from (World Bank, 2026; World Bank, 2025a; European Commission JRC, 2026); a flag means the worst fifth of 217 economies. The 2000 bars apply the 2024 thresholds to year-2000 data (climate score fixed), so they show progress against a constant yardstick.

This is the reason for an integrated framework. Countries with one or two weaknesses can often address them one at a time. Countries with five, six or seven face a situation in which every service depends on another that is also failing, and where sequencing and coordination matter as much as money.

SECTION 03

The Development–Vulnerability Relationship

An important proposition in the H Heuristics approach is that development itself can function as long-term polycrisis risk reduction. The data support it for most services, and show where it does not hold automatically.

IN BRIEF

- Economic development is not separate from resilience: through the right pathways it changes who is exposed and how badly.
- Across Global South countries, national income explains much of the variation in electricity, clean cooking, sanitation and child survival (correlations 0.73 to 0.85), but almost none of the variation in air pollution (−0.20).
- Development pathways must therefore be chosen and designed, not simply waited for.

3.1 Development as risk reduction

It is common to treat economic development and resilience as separate goals, as though growth were one project and protection from shocks another. The H Heuristics approach starts from a different proposition: when pursued through appropriate pathways, development strengthens the very conditions that decide whether populations are exposed to interconnected threats and how severely those threats affect them. A household with reliable electricity, a clean cooking fuel, a sound roof, a nearby clinic and a bank account is less exposed to nearly every shock than one without them, whatever the cause of the shock.

Table 2 sets out ten development interventions and the vulnerability each one reduces. The right-hand column adds the strongest evidence for the link and, where relevant, an honest note about limits.

The objective is to create development pathways that improve living conditions and reduce vulnerability across several dimensions at once. That is why the interventions that look least glamorous, such as power for health clinics, a clean fuel for cooking and warning systems that reach villages, can have the broadest reach: each serves several risk categories simultaneously.

Table 2 Ten development interventions and the vulnerability each reduces

Development intervention	Vulnerability reduction	Evidence and caution
Universal electricity access	Reduces energy insecurity; enables health care, education and economic activity	655 million people still lack power (World Bank, 2026). Solar electricity cost fell about 90% in 2010–2023 (IRENA, 2024)
Clean cooking adoption	Reduces household exposure to harmful air pollution	Household air pollution killed about 2.9 million people in 2021 (WHO, 2026). A large trial found no effect of LPG on severe infant pneumonia, so exclusive use and quality of use matter (HAPIN Investigators, 2024)
Climate-resilient infrastructure	Reduces disruption from floods, storms and extreme heat	Each $1 invested in more resilient infrastructure yields about $4 in benefits in low- and middle-income countries (Hallegatte et al., 2019)
Improved health care systems	Strengthens capacity to manage disease and environmental health risks	Rwanda cut under-five mortality by about 80% in 2000–2024 with community health workers and insurance (Farmer et al., 2013; World Bank, 2026)
Affordable housing	Reduces exposure to heat, flooding and unsafe living conditions	Evidence is mostly through income and building quality; deaths from hazards fall steeply as incomes rise (Kahn, 2005; Toya and Skidmore, 2007)
Clean industrialization	Reduces pollution while supporting productive economic development	Not automatic: PM2.5 is almost unrelated to income across these countries, so clean technology has to be chosen deliberately
Digital infrastructure	Improves access to information, services and economic opportunities	Mobile money in Kenya lifted an estimated 2% of households out of extreme poverty (Suri and Jack, 2016); about 2 billion people remain offline (ITU, 2025)
Water and sanitation investment	Reduces health risks and strengthens drought resilience	1,433 million people lack basic sanitation (World Bank, 2026); coverage rises steeply with income
Education and human capital	Improves adaptive capacity and long-term opportunity	Educational attainment is among the strongest predictors of lower disaster mortality (Lutz et al., 2014)
Institutional strengthening	Improves coordination, preparedness and implementation capacity	Countries with stronger institutions suffer fewer disaster deaths and recover faster from shocks (Kahn, 2005; Rodrik, 1999)

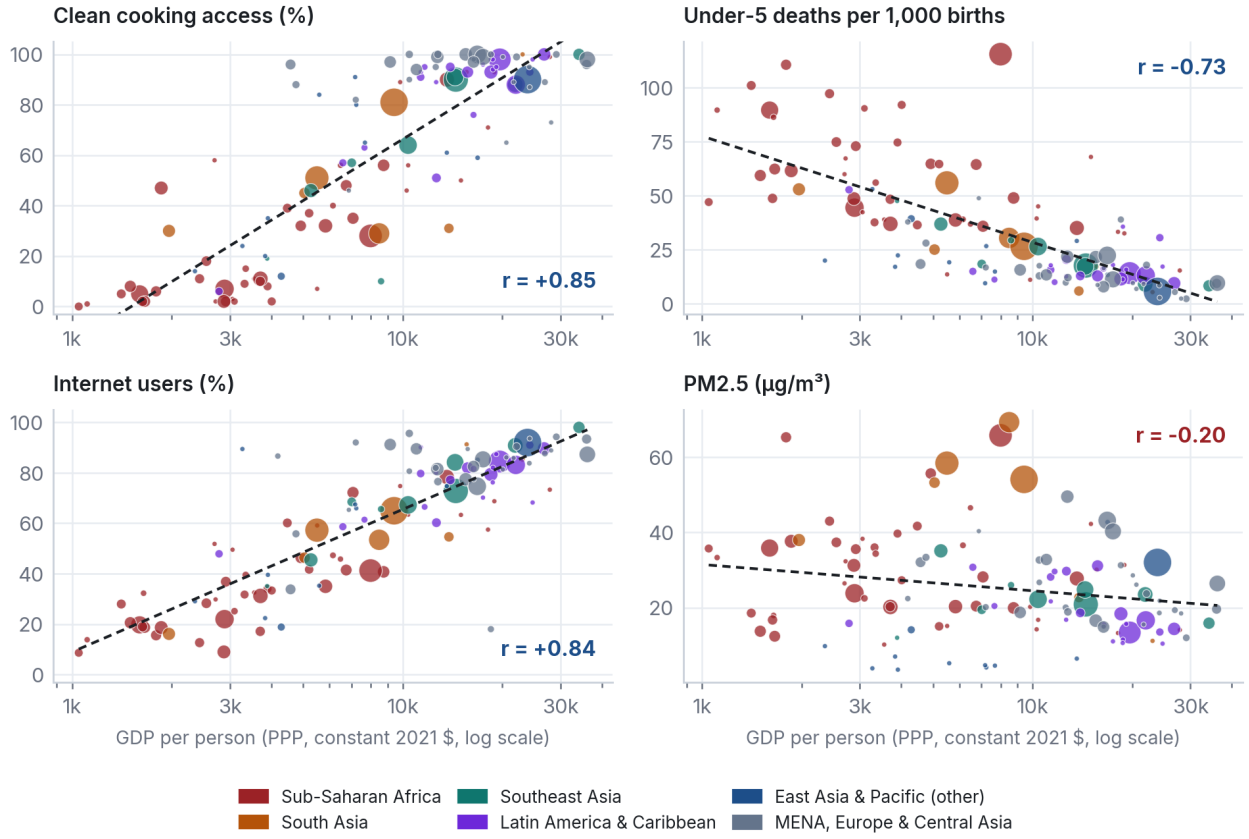
Source: H Heuristics, from Hughes (2026a) and the sources cited in each row.

3.2 What the data show

If development reduces vulnerability, countries with higher incomes should look better on the measures that matter. Figure 6 tests this across 124 Global South countries. The relationship is strong for most services. Income per person has a correlation of 0.85 with clean cooking access, 0.84 with internet use, 0.77 with sanitation, 0.77 with electricity access and -0.73 with under-five mortality. A higher national income is, on average, associated with services that protect people. Correlation is not proof of cause, but the pattern is consistent with a large body of research on income, institutions and disaster deaths (Kahn, 2005; Toya and Skidmore, 2007; Formetta and Feyen, 2019).

Figure 6 Income is closely tied to clean cooking, internet use and child survival, but hardly at all to air pollution

Selected indicators against GDP per person across Global South countries



Source: World Bank World Development Indicators (World Bank, 2026), latest year, 2024 or nearest. Each dot is a country in the Global South (size shows population); dashed line is a linear fit against the logarithm of income; r is the correlation.

3.3 Where development does not fix it by itself

Air pollution is the clearest exception. Across Global South countries the correlation between income and PM2.5 is only -0.20: a country that is far richer than its neighbours is not, on average, much cleaner. Many fast-growing countries have some of the most polluted air in the world, because growth has been powered by coal, diesel, biomass burning and unregulated industry. The population-weighted average exposure in the Global South (37 micrograms per cubic metre) has barely moved since 2000 even as other indicators improved (Figure 2). Climate hazard is a similar case: it is set largely by geography, and income barely changes it, although income changes how much damage it does (Kahn, 2005).

The lesson is not that development is a poor route to resilience. It is that development reduces vulnerability **when the pathway is chosen with that aim**. Growth through clean power, clean transport, regulated industry and well-planned cities reduces vulnerability twice, once through income and again through lower exposure. Growth that locks in pollution or builds in floodplains can reduce one vulnerability while creating another. This is the reason the framework in Section 4 speaks of pathways and not simply of growth.

Table 3 Development ladder: services and outcomes by income group, 2024

Indicator	Low income	Lower-middle	Upper-middle	High income
Countries (people, millions)	25 (747)	47 (2,907)	59 (3,068)	86 (1,395)
Electricity access (%)	49	91	99	100
Clean cooking access (%)	16	64	90	100
Basic sanitation (%)	35	74	94	98
Internet users (%)	20	59	86	93
Under-5 deaths per 1,000 births	62	39	11	5
PM2.5 (µg/m³)	31	50	27	13
Government effectiveness (−2.5 to +2.5)	-1.21	-0.05	0.27	1.13

Source: H Heuristics calculations from (World Bank, 2026; World Bank, 2025a); population-weighted means. Income groups follow the World Bank classification (World Bank, 2025b).

The ladder shows how much moving up one income band matters for most outcomes: clean cooking rises from 16% to 64% to 90%, and child mortality falls from 62 to 39 to 11 per 1,000. It also shows that air pollution does not fall in a straight line: it peaks in the lower-middle-income group (50 micrograms per cubic metre, driven by South Asia), and upper-middle-income countries average 27, more than twice the high-income level of 13, which is what a growth path built on dirty fuels produces. Government effectiveness improves steadily with income and is itself part of the explanation for why services improve.

3.4 Why gains need protecting

Development gains are not permanent. Shocks can reverse them: output losses after financial and political crises tend to last (Cerra and Saxena, 2008), tropical cyclones depress national incomes for more than a decade (Hsiang and Jina, 2014), and disasters push an estimated 26 million people into extreme poverty each year, because poor households cannot smooth consumption or rebuild assets (Hallegatte et al., 2017). A development pathway that improves averages but leaves households one shock from poverty is fragile. The framework therefore treats development and protection as one agenda: build the services, and build them to withstand the shocks that the century will bring.

SECTION 04

The H Heuristics Polycrisis Resilience Framework

H Heuristics approaches Polycrisis Resilience as an integrated framework for reducing human and systemic vulnerability to interconnected global crises. In the Global South it can be organised around six complementary development priorities.

IN BRIEF

- Six priorities: clean energy, climate adaptation, clean industrialization, human development, technology diffusion and institutional capacity.
- They are mutually reinforcing: each strengthens the others, and together they build systems that absorb disruption and maintain essential services.
- A five-stage cycle turns the priorities into practice: identify, prioritise, strengthen, reduce and sustain.

4.1 Six complementary priorities

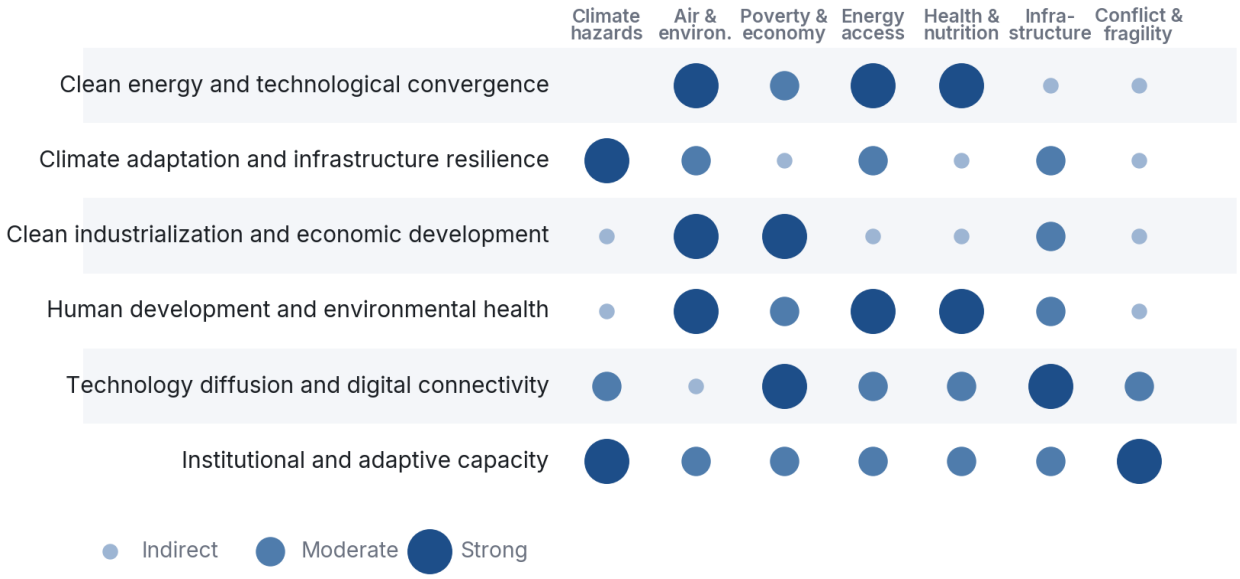
The six priorities below are not a checklist to be completed one by one. They are six views of one task: building development systems that can absorb disruption, adapt to changing conditions and keep essential services running. Figure 7 shows how each priority bears on the seven vulnerabilities from Section 1. The scoring is a transparent judgement by H Heuristics, and readers may weigh it differently, but two patterns are clear. No priority tackles everything, and every vulnerability is addressed by at least three priorities, which is why a single-sector programme leaves gaps.

4.2 Clean energy and technological convergence

Accelerating access to affordable electricity, renewable energy, energy storage, modern grids and clean cooking technologies. The objective is to reduce energy poverty while limiting pollution and strengthening energy security. The case is strong because energy sits upstream of so many other services: clinics need power for vaccines and surgery, pumps need power for water, and phones need power for payments and weather warnings. About 655 million people have no electricity and 1,984 million cook with polluting fuels, and household air pollution alone killed about 2.9 million people in 2021 (WHO, 2026). The economics have shifted: the global average cost of new solar power fell by about 90% between 2010 and 2023 (IRENA, 2024), making distributed solar and storage the least-cost way to reach many unserved communities (IEA et al., 2025).

Figure 7 Each priority has a home area where its effect is strongest, and every vulnerability is reached by several priorities

Strength of link between each priority and each of the seven vulnerabilities



Source: H Heuristics judgement, based on the evidence discussed in this section and Hughes (2026a). Larger circles indicate stronger and better-evidenced links.

4.3 Climate adaptation and infrastructure resilience

Strengthening housing, transport, drainage, water systems, agriculture and urban infrastructure to withstand increasingly challenging conditions. The urban population of the Global South grew from 1.9 billion in 2000 to 3.6 billion in 2024; roads, drains, homes and power lines laid down now will shape exposure to floods and heat for generations. Early warning is among the best-evidenced investments: warning people 24 hours ahead of a storm or heatwave can cut damage by about 30% (Global Commission on Adaptation, 2019), and countries with limited multi-hazard warning coverage have disaster mortality several times higher than those with comprehensive coverage (UNDRR and WMO, 2023). Bangladesh shows what sustained preparedness achieves: after decades of warnings, shelters and volunteers, the far stronger Cyclone Sidr in 2007 killed about 3,400 people, against hundreds of thousands in 1970 (Haque et al., 2012). International adaptation finance is far below need: developing countries' needs are estimated at $310–365 billion a year by 2035 against about $26 billion of international public flows in 2023 (UNEP, 2025).

4.4 Clean industrialization and economic development

Supporting productive transformation through cleaner manufacturing, technological modernization, job creation and more diversified economic systems. Average income in the Global South is about $13,649 per person (at purchasing power parity) against $58,376 in high-income countries, and economies that depend on a few climate-sensitive sectors are the most exposed to shocks. Diversification shifts risk away from rain-fed farming and commodity prices. The word *clean* does real work here: because air pollution did not fall with income (Figure 6), industrial growth that adopts cleaner technology from the start is the way to gain jobs and income without adding to the burden of disease. Evidence suggests that convergence with richer economies has been steadier in the twenty-first century than in the twentieth (Kremer et al., 2022), which gives this priority a base to build on.

4.5 Human development and environmental health

Improving health care access, air quality, sanitation, nutrition, education and housing. These interventions reduce the conditions that make populations especially vulnerable to interconnected crises. Under-five mortality in the Global South is 29 per 1,000 births against 5 in high-income countries; there are 1.4 physicians per 1,000 people against 3.8; about 10% of people are undernourished; and ambient and household air pollution together are estimated to cause around 6.7 million deaths a year (World Bank, 2026; WHO, 2026). Healthier and better-educated people survive disasters and epidemics more often, understand warnings and find new livelihoods (Lutz et al., 2014). Human development is therefore a direct form of risk reduction as well as a goal in itself.

4.6 Technology diffusion and digital connectivity

Expanding access to affordable technologies, telecommunications, digital public infrastructure, scientific knowledge and productivity-enhancing innovations. Internet use is 67% in the Global South against 93% in high-income countries, and only 20% in low-income countries (World Bank, 2026). Connectivity matters for resilience because modern risk management runs on it: storm warnings by phone, mobile money and cash transfers that reach households within days of a shock, telemedicine, and the weather and crop data that guide farmers. Mobile money is the standard example: in Kenya it raised household consumption and cut extreme poverty (Suri and Jack, 2016). The wider point is about speed. Technologies spread more slowly to poorer countries, and shortening that lag is one of the largest available levers on both income and resilience (Comin and Hobijn, 2010).

4.7 Institutional and adaptive capacity

Strengthening governance, public administration, disaster preparedness, financial systems and coordination between development, environmental and public-health institutions. Government effectiveness in low-income countries scores -1.21 on a scale from −2.5 to +2.5, against 1.13 in high-income countries (World Bank, 2025a). Capable institutions are what turn money into outcomes. Adaptive social protection, which uses national delivery systems to channel support to affected households when a shock hits, has been shown to work in Ethiopia and Kenya (Bowen et al., 2020); disaster finance arranged in advance arrives faster and is spent better than appeals launched afterwards (Clarke and Dercon, 2016); and regional risk pools such as the Caribbean Catastrophe Risk Insurance Facility pay out within about two weeks of a trigger event (CCRIF SPC, 2025). Institutions also matter for what countries cannot do alone: pooling risk across borders, as the African Risk Capacity does for drought (African Risk Capacity, 2025), works only when national systems can use the money well.

4.8 Mutually reinforcing priorities

The priorities depend on each other. Clean power makes clinics, schools and digital services work. Digital connectivity delivers the warnings that adaptation relies on and the payments that social protection needs. Capable institutions plan the networks, regulate the pollution and run the programmes. Better health and education raise the skills that clean industry needs. Together, their implementation is intended to produce development systems more capable of absorbing disruptions, adapting to change and maintaining essential services. Positive feedback of this kind is the opposite of the vicious cycles described in Section 1, and it is the reason the framework insists on treating the priorities together (Meadows, 2008; Sawin, 2018).

4.9 From priorities to practice: a five-stage cycle

The framework turns the priorities into a repeating cycle of five stages, with continuous assessment, learning and improvement at the centre (Hughes, 2026a).

Table 4 The five-stage Polycrisis Resilience cycle applied to the Global South

Stage	Question it answers	Where in this report
1. Identify vulnerability	Where are people most exposed, and to which interacting challenges?	Seven-challenge map and stacking (Section 2)
2. Prioritise development interventions	Which investments reduce the most vulnerability for each dollar?	Interventions table and priorities (Section 3, Section 4)
3. Strengthen interconnected systems	How do energy, health, water, digital, urban and institutional systems support each other?	Regional applications (Section 5)
4. Reduce systemic vulnerability	How many fewer people are exposed, and how much less is lost in shocks?	Scenarios to 2100 (Section 6)
5. Strengthen long-term resilience	Are gains durable, financed and learning from experience?	Economics and measurement (Section 7, Section 8)

Source: H Heuristics, from the framework in Hughes (2026a).

SECTION 05

Regional Applications

The framework does not prescribe one development path for every country. Implementation should reflect regional conditions, national priorities, available resources and the specific mix of vulnerabilities each population faces.

IN BRIEF

- Sub-Saharan Africa: energy access and basic infrastructure. South Asia: heat, air and floods. Southeast Asia: coasts and clean industry.
- Latin America: inequality and urban infrastructure. Small island states: coastal adaptation and resilient power.
- Regions differ most on deprivation (Sub-Saharan Africa) and on hazard exposure (East and South Asia); they differ least on the value of integration.

5.1 Six regional groups at a glance

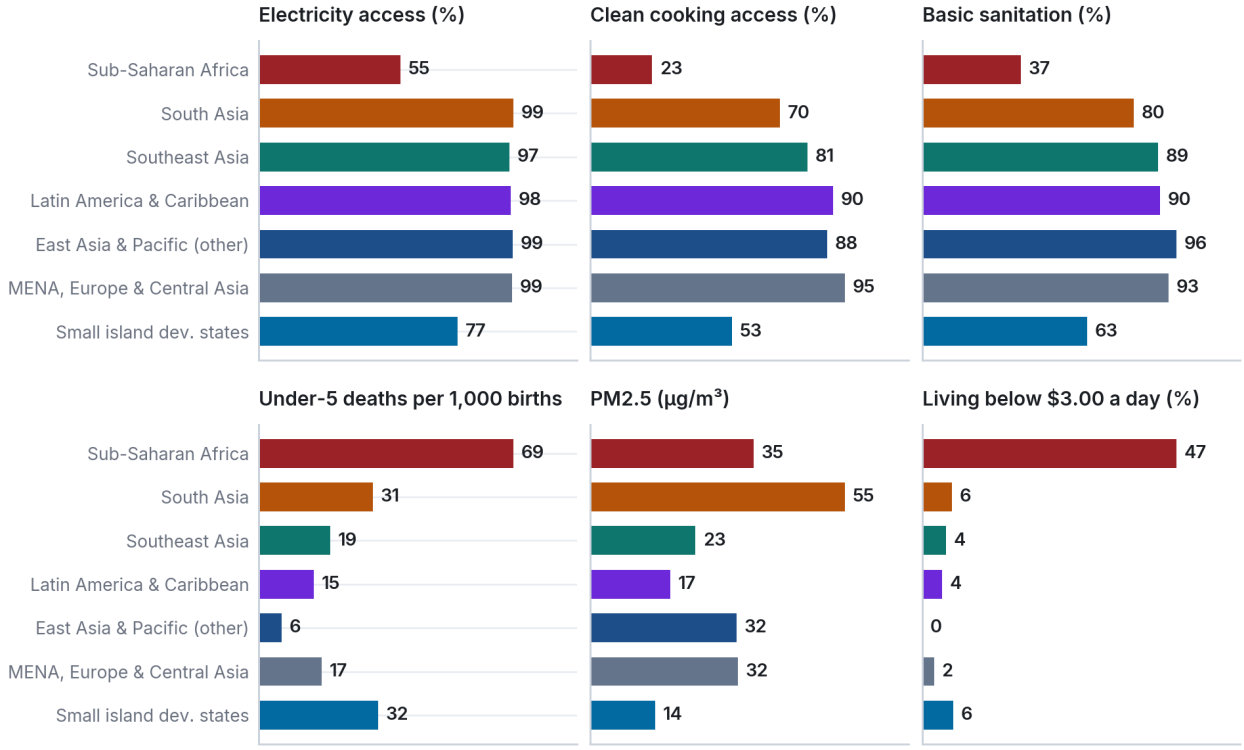
The Global South's economies are grouped here into six regional blocks plus the small island developing states, which cut across the regions. Figure 8 shows how different the starting points are. Sub-Saharan Africa has 55% electricity access and 23% clean cooking; every other region is above 97% and 70% respectively. Child mortality ranges from 6 per 1,000 in East Asia and the Pacific to 69 in Sub-Saharan Africa. South Asia has the most polluted air (55 μg/m^3), more than three times the level in the small island states. A single global programme would fit none of them well.

5.2 Sub-Saharan Africa

Sub-Saharan Africa is where the framework's logic is most urgent. The region's 1.29 billion people are projected to grow to 3.5 billion by 2100, more than a third of humanity (United Nations, 2024). Today 88% of the Global South's unelectrified people live there, 82% of its people live in countries in the worst fifth on four or more challenges, and 47% live below the $3 poverty line. Priorities include electricity access, clean cooking, climate-resilient agriculture, water security, health care infrastructure, urban development and industrialization. Reducing household pollution exposure and improving basic infrastructure could generate particularly significant overlapping benefits. The region's climate hazard score is actually below that of South Asia and East Asia: the issue is less the size of the hazard than the thinness of protection against it (Hughes, 2026b; European Commission JRC, 2026). A full analysis is in the companion report on Africa (Hughes, 2026b).

Figure 8 Starting points differ widely: Africa lags on services, South Asia on air, and the island states on almost everything

Six indicators by region, 2024



Source: World Bank World Development Indicators (World Bank, 2026), latest year; population-weighted regional means. Small island developing states (27 low- and middle-income members of the UN list (UN-OHRLLS, 2025)) overlap with the regions and are shown separately.

Table 5 Regional profiles: people, overlap of challenges and projected change

Region	Countries	People 2024 (m)	People 2100 (m)	In countries with 4+ challenges (%)	Overall score (0–100)
Sub-Saharan Africa	47	1,290	3,482	82	19
South Asia	8	1,971	2,409	15	26
Southeast Asia	9	689	675	0	38
Latin America & Caribbean	23	623	583	2	46
East Asia & Pacific (other)	13	1,452	682	3	48
MENA, Europe & Central Asia	31	698	959	6	43
Small island developing states	27	59	69	42	37
Global South	131	6,723	8,789	21	34

Source: H Heuristics calculations from (World Bank, 2026; World Bank, 2025a; European Commission JRC, 2026; United Nations, 2024). Overall score is the dashboard in Section 8 (higher is better; high-income countries score 66).

5.3 South Asia

South Asia combines near-universal electricity (99%) with the world's worst air pollution (55 µg/m³ on average) and high exposure to floods, storms and heat. Its 1.97 billion people are pro-

jected to grow to about 2.4 billion by mid-century and then level off (United Nations, 2024). 583 million people still lack clean cooking and 393 million lack basic sanitation. The 2022 floods in Pakistan caused damage and losses of more than $30 billion (Government of Pakistan et al., 2022), an example of a hazard that interacts with debt, food prices and health. Priorities include extreme-heat adaptation, air pollution reduction, flood management, resilient urbanization, clean energy, public health and improved water systems. Because South Asia has already solved much of the access problem, its resilience agenda is mostly about the *quality* of development: clean air, safe cities and reliable services.

5.4 Southeast Asia

Southeast Asia has largely closed the access gaps (97% electricity, 81% clean cooking, 89% sanitation) and none of its nine economies has four or more flags. Its exposure is mainly to the sea and the weather: 94% of its people live in countries with climate hazard scores in the world's worst fifth, from typhoons and coastal flooding to drought. Its population of 689 million is projected to peak around mid-century and decline slightly by 2100 (United Nations, 2024). Priorities include coastal protection, climate-resilient infrastructure, sustainable industrialization, ecosystem protection, urban adaptation and technological modernization. Southeast Asia is where manufacturing growth, port cities and mangrove coasts meet, so the choice between clean and dirty industrial growth will matter more here than in most places.

5.5 Latin America and the Caribbean

Latin America and the Caribbean is the most urbanized region in the Global South (81% urban) and has high access to basic services: 98% electricity, 90% clean cooking. Its challenge is less about access than about unevenness and quality. Government effectiveness scores -0.27, below the Global South average, and Haiti is one of only three countries in the world in the worst fifth on all seven measures. The region's population is projected to rise slightly to about 688 million by 2050 and then fall to 583 million by 2100 (United Nations, 2024). Priorities include reducing inequality, improving urban infrastructure, protecting ecosystems, strengthening health care, expanding clean energy and improving climate resilience in agricultural regions. Caribbean countries also share the exposure of the small island states, and pooled insurance such as CCRIF shows how a region can manage hazard risk together (CCRIF SPC, 2025).

5.6 Small island developing states

The 27 low- and middle-income members of the small island developing states group have a combined 59 million people, under 1% of the Global South, and contribute about 0.2% of global fossil-fuel CO_2 (Our World in Data, 2025a; UN-OHRLLS, 2025). Yet their situation is among the most precarious. Electricity access is 77% and clean cooking 53%; they are flagged on climate hazard, air pollution, poverty, food and water and child health at similar, moderate rates, so that 42% of their people live in countries with four or more flags. Their small size makes everything more expensive (power, ports, water, health care) and a single storm can erase a large share of national output. Priorities include coastal adaptation, water security, resilient electricity systems, disaster preparedness, climate-resilient housing and economic diversification. Because their emissions are tiny, their path to resilience depends heavily on outside finance and on risk pooling.

5.7 East Asia, the Middle East and Central Asia

Two further blocks complete the Global South. **East Asia and the Pacific** (China, Mongolia, North Korea and the Pacific islands) has the highest overall score of any region (48) but the greatest exposure to climate hazards, with 99% of its people in worst-fifth countries, and a population projected to shrink from 1.5 billion to 0.7 billion by 2100, which brings the challenge of ageing societies (United Nations, 2024). **The Middle East, North Africa, Europe and Central Asia** block has high basic services (99% electricity, 95% clean cooking) but low scores for government effectiveness and political stability, with 62% of its people in countries flagged for instability. For both blocks, conflict, governance and ageing, not access, are the main resilience questions.

Table 6 summarises how the six priorities might be weighted in each regional group. It is a judgement by H Heuristics from the data above, meant to show that the mix differs, not to rank the priorities against each other: all six matter everywhere, and national plans should replace regional averages.

Table 6 Illustrative weight of the six priorities in each region

Region	Clean energy	Adaptation	Clean industry	Human development	Technology	Institutions
Sub-Saharan Africa	High	High	Medium	High	Medium	High
South Asia	Medium	High	Medium	High	Lower	Medium
Southeast Asia	Lower	High	High	Lower	Medium	Medium
Latin America and Caribbean	Medium	Medium	Medium	Medium	Lower	High
Small island developing states	High	High	Medium	Medium	Lower	Medium

Source: H Heuristics judgement based on the indicators in this section and the framework in Hughes (2026a). High = largest gap or greatest leverage in the region today.

5.8 What the regional pattern teaches

Three conclusions follow. First, the sequencing of priorities differs: access comes first where services are missing (Africa), quality and exposure first where access is high (Asia, Latin America), and risk transfer and coastal defence where scale is small (islands). Second, overlap is regional: the 41 countries with four or more flags are 33 in Sub-Saharan Africa, 4 island states, and a handful elsewhere, so tailoring means spending most of the integrated effort in a small number of places. Third, within-region differences are wide: overall country scores in Sub-Saharan Africa range from 10 (Niger) to 67 (Mauritius), and in Latin America from 17 (Haiti) to 65, so national plans matter more than regional averages.

SECTION 06

The Importance of the 2025–2100 Timeframe

Polycrisis Resilience should be understood as a long-term development and risk-reduction undertaking rather than a short-term crisis management strategy. Vulnerability reduction is cumulative: earlier improvements strengthen later generations.

IN BRIEF

- Four strategic periods structure the century: foundations, convergence, consolidation and sustaining.
- At current pace 1.7 billion people would still lack clean cooking in 2100; at best-peer pace, 84 million.
- Cumulative child deaths in 2025–2100 would be 209 million at current pace against 92 million at best-peer pace.

6.1 A century of resilience-building

The remainder of the twenty-first century offers an extended period during which governments, institutions, businesses and communities can improve the underlying conditions that influence vulnerability. The framework divides that time into four strategic periods. They are illustrative planning periods, not predictions or fixed international targets.

Table 7 Four strategic periods, 2025–2100, with what the scenarios imply for each

Period	Focus	What the scenarios suggest
1. 2025–2035: Establishing foundations	Accelerate basic infrastructure, clean cooking, electricity access, health care, adaptation planning and institutional capacity	At best-peer pace the electricity gap falls from 655 million people to 445 million by 2030 (current pace: 575 million)
2. 2035–2050: Accelerating convergence	Expand technology diffusion, clean industrialization, resilient cities, digital infrastructure and socioeconomic development	By 2050 555 million lack clean cooking at best-peer pace, against 1,608 million at current pace
3. 2050–2075: Consolidating resilience	Continue reducing environmental exposure, strengthening infrastructure, improving adaptive capacity and addressing persistent inequalities	Best-peer pace has all four basic services above 98% coverage by about 2070; at current pace, 1.1 billion still lack sanitation
4. 2075–2100: Sustaining long-term resilience	Maintain and modernize systems, adapt to changing conditions and prevent re-emergence of structural vulnerabilities	Population plateaus near 8.8 billion; the work is upkeep and adaptation rather than catching up

Source: H Heuristics framework (Hughes, 2026a); scenario numbers from H Heuristics calculations described below.

6.2 Vulnerability reduction is cumulative

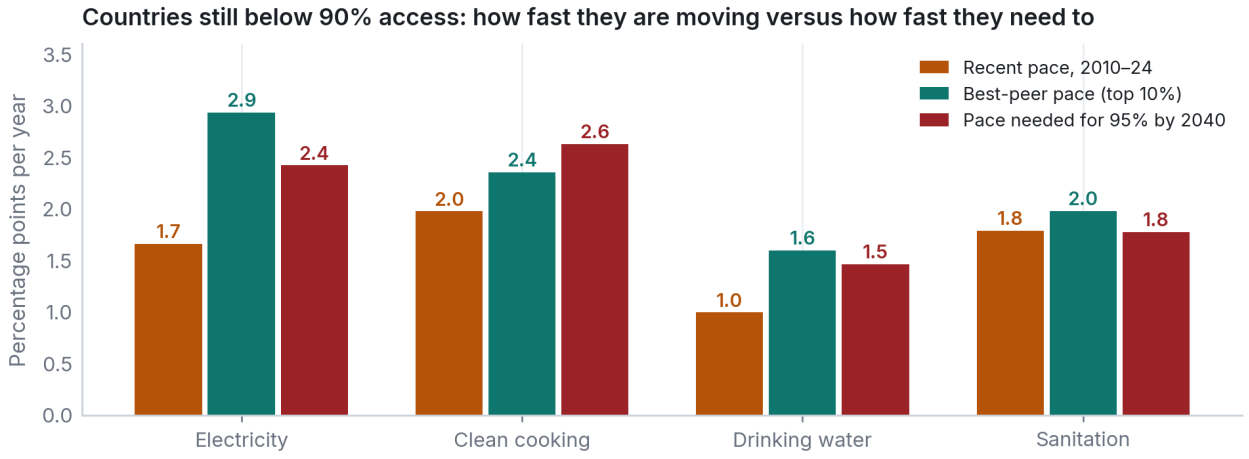
The underlying principle is that vulnerability reduction builds up over time. Improvements made in earlier decades strengthen the ability of future generations to manage later challenges. A country that expands electricity access, improves health care, reduces air pollution and strengthens water security can enter the 2050s with a substantially different set of conditions from a country that fails to make comparable progress: its children are healthier and better schooled, its cities are built to a higher standard, and its institutions have practised managing shocks. Evidence on how education and income protect against disaster deaths supports this view (Lutz et al., 2014; Formetta and Feyen, 2019). This does not eliminate future risks. It improves the capacity to withstand them.

6.3 How fast, compared with how fast is needed

The Global South has already shown rapid progress, but the question is whether it is rapid enough. Figure 9 compares three paces for the countries that still have below 90% access to each service: their own recent pace (2010–24), the pace achieved by the fastest tenth of comparable countries over any 15-year period, and the pace that would be needed for 95% access by 2040. For electricity, countries with a gap are gaining 1.7 points a year against 2.4 needed; for clean cooking 2.0 against 2.6; for drinking water 1.0 against 1.5; and for sanitation 1.8 against 1.8. Only sanitation is roughly on track. In every case the best-peer pace is at or above what is needed, except for clean cooking, where even the best performers (2.4 points a year) fall slightly short of a 2040 deadline (2.6); a 2050 deadline would need 1.6.

Figure 9 The Global South is moving at about two-thirds to three-quarters of the pace needed for near-universal basic services by 2040, except in sanitation

Percentage points of the population gaining access per year



Source: H Heuristics calculations from World Bank WDI (World Bank, 2026). Recent pace: population-weighted trend 2010–24 in countries below 90% access. Peers: 15-year gains in non-high-income countries starting between 15% and 75%. Needed: gap to 95% divided by 16 years, population-weighted.

What best-peer pace means. It is the pace achieved by the fastest tenth (90th percentile) of low- and middle-income countries over 15-year windows, starting from a comparable level of access. It is demanding, but it is an observed pace, not a theoretical one. The report uses it as a benchmark for ambition, not as a forecast: it does not assume every country reaches it, and it uses each country's own recent pace where that is faster.

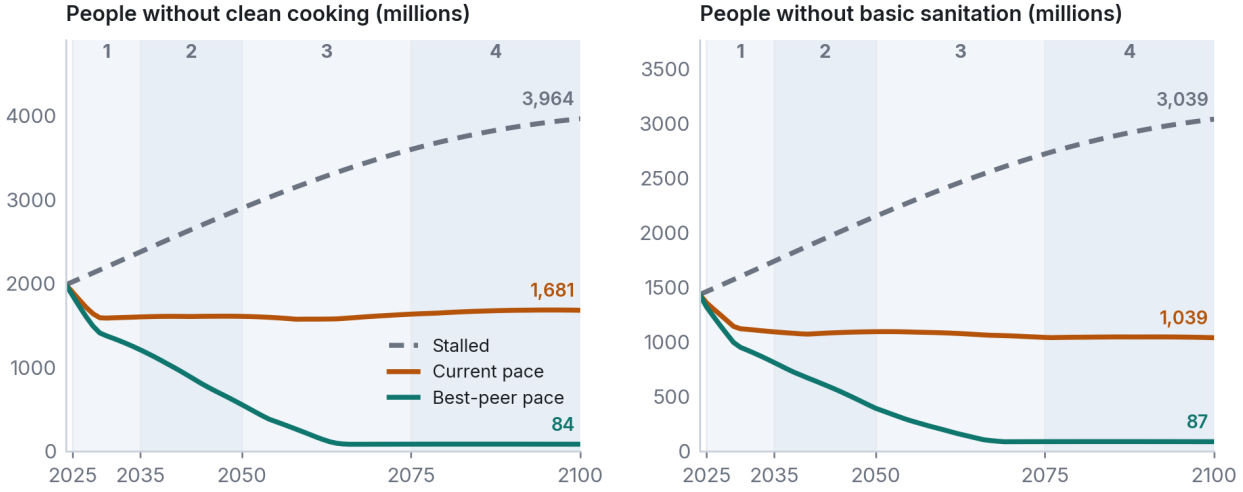
6.4 Three paths to 2100

To show what the pace of progress means over a century, the report projects the number of people without each basic service under three paths, combining each country's progress with United Nations population projections (United Nations, 2024). In the **stalled** path countries make no further progress, so population growth alone adds to the gaps. In the **current pace** path each country continues at its own 2010–24 rate (zero if that was negative), capped at 99% access. In the **best-peer pace** path each country gains at least the pace of the fastest tenth of comparable countries. These are arithmetic scenarios, not forecasts.

Figure 10 and Table 8 show the results. In the stalled path, the number of people without clean cooking would rise from about 2.0 billion to 4.0 billion by 2100, as the population grows and no one is reached. At current pace it falls early and then flattens at about 1.7 billion, because the countries that are making no progress, mostly in Sub-Saharan Africa, hold a steadily growing share of the population. At best-peer pace the gap is below 84 million by 2070. The difference between current and best-peer pace is 88 billion person-years of cooking with polluting fuels over 2025–2100.

Figure 10 At current pace the gaps in clean cooking and sanitation stop shrinking by mid-century; at best-peer pace they nearly close

People without service in the Global South under three paths (millions), 2024–2100



Source: H Heuristics calculations from World Bank WDI (World Bank, 2026) and UN population projections (United Nations, 2024). Numbered bands are the four strategic periods; labels show 2100 values.

6.5 Where the gap would sit

Figure 11 shows where the people left behind would live. In 2024 Sub-Saharan Africa and South Asia hold 80% of the cooking gap. By 2100 at current pace, South Asia's gap nearly closes (38 million) while Sub-Saharan Africa's grows to 1,527 million, which is 91% of the total. The century's remaining deprivation is, in this sense, mainly an African question, and the report on Africa treats it in depth (Hughes, 2026b). Best-peer pace in Africa alone would cut the 2050 cooking gap from 1,253 million to 455 million.

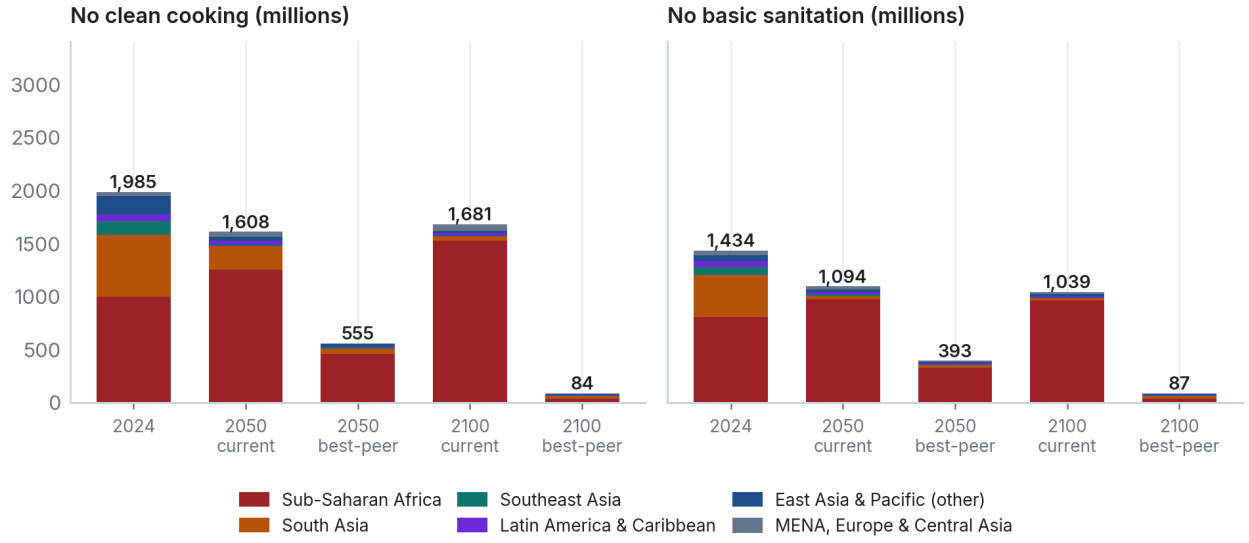
Table 8 People without basic services under three paths (millions), and person-years of deprivation to 2100 (billions)

Service	Path	2024	2040	2070	2100	Person-years 2025–2100 (bn)
Electricity	Stalled	655	931	1,448	1,791	98
	Current pace	655	466	400	326	33
	Best-peer pace	655	160	45	51	9
Clean cooking	Stalled	1,985	2,554	3,481	3,964	242
	Current pace	1,985	1,608	1,612	1,681	124
	Best-peer pace	1,985	997	84	84	36
Drinking water	Stalled	681	901	1,289	1,526	89
	Current pace	681	461	409	443	34
	Best-peer pace	681	256	84	85	13
Sanitation	Stalled	1,434	1,878	2,624	3,039	181
	Current pace	1,434	1,072	1,055	1,039	82
	Best-peer pace	1,434	669	87	87	27

Source: H Heuristics calculations from (World Bank, 2026; United Nations, 2024). Illustrative scenarios, not forecasts.

Figure 11 Left behind in 2100 would be mostly Sub-Saharan Africans, unless the pace there accelerates

People without clean cooking (left) and basic sanitation (right) by region, millions



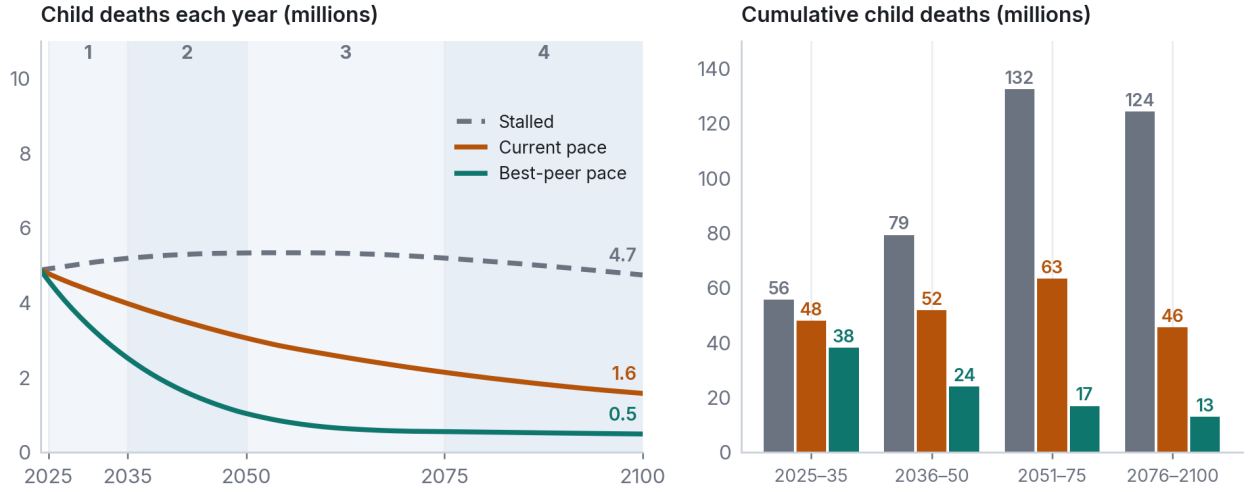
Source: H Heuristics calculations from (World Bank, 2026; United Nations, 2024). Region colours as in earlier figures; small island states are included within their regions.

6.6 What the paths mean for human lives

The same arithmetic can be applied to child survival and to air pollution. Under-five deaths in the Global South fell from 10.2 million in 2000 to 4.9 million in 2024. Combining the paths with UN projections of births, the cumulative number of child deaths in 2025–2100 would be about 392 million if mortality stopped improving, 209 million at each country's recent rate of decline and 92 million at best-peer pace (Figure 12). The difference between current and best-peer pace is 117 million children, and 75% of the current-pace total is in Sub-Saharan Africa. For household air pollution, applying 2021 death rates (about 134 deaths a year per 100,000 people without clean cooking) to the cooking paths gives 107 million deaths over the century at current pace and 36 million at best-peer pace, a difference of 71 million. These numbers are indicative: they assume that the risk per exposed person stays constant and that cleaner cooking fuels deliver the full health benefit, which trials suggest is not guaranteed (HAPIN Investigators, 2024). Their value is in showing scale, and in showing that most of the difference arises after 2035.

Figure 12 Annual child deaths fall under every path except stalled, but cumulative lives saved by faster progress come mostly after 2035

Left: child deaths per year (millions). Right: cumulative deaths in each period (millions)



Source: H Heuristics calculations from World Bank WDI under-five mortality (World Bank, 2026) and UN births projections (United Nations, 2024). Numbered bands are the four strategic periods; best-peer path assumes a 6.7% annual proportional decline at least.

The timing is the important lesson. More than half of the lives saved by faster progress (current versus best-peer) fall in the period 2036–2075 (74 of 117 million), which is the generation that today's foundations will protect. Slow early action cannot easily be made up later, because the population that needs the services keeps growing.

SECTION 07

Economic Implications and the Value of Prevention

An important dimension of Polycrisis Resilience is the economic value of preventing or reducing vulnerability before interconnected crises generate larger consequences. The evidence is encouraging but must be tested country by country.

IN BRIEF

- Crises hit several sectors at once: farms, clinics, roads, schools and output.
- Reported benefit-cost ratios for adaptation and resilient infrastructure run from 2:1 to more than 10:1.
- Investments that reduce several vulnerabilities together may return more than a single-sector calculation shows, but not every project pays everywhere.

7.1 The cost of letting vulnerability stand

The economic costs of polycrisis extend across several sectors at once. Environmental degradation can cut farm productivity, raise health spending, damage infrastructure, disrupt schooling and weaken economic output, and the effects reinforce one another. Poor households bear the largest part. The World Bank estimates that natural disasters cause consumption losses equivalent to about $520 billion a year, far more than the value of the assets destroyed, because poor households cannot smooth their consumption or rebuild what they lose, and that disasters push around 26 million people into extreme poverty every year (Hallegatte et al., 2017). Health costs add to the total: air pollution from household fuels and from the ambient air together is estimated to cause about 6.7 million deaths a year in the Global South (WHO, 2026), and each death brings lost income and care costs. Recoveries are slow: tropical cyclones depress national incomes for more than a decade (Hsiang and Jina, 2014), and output losses after crises tend to be persistent (Cerra and Saxena, 2008).

7.2 Evidence on returns

Conversely, integrated development investments can produce benefits across several sectors. The evidence from global studies points to high average returns on prevention, summarised in Table 9. These are averages across many places and designs, and they are not guarantees for any particular project. Returns depend on design, maintenance and governance, and the studies are mostly of resilience investments rather than of the whole development agenda.

Table 9 What the economic evidence says about prevention and resilience

Source	Finding	Scope and caveat
Global Commission on Adaptation (Global Commission on Adaptation, 2019)	$1.8 trillion invested globally in 2020–2030 in five areas could yield $7.1 trillion in net benefits; benefit-cost ratios between 2:1 and more than 10:1	Five areas only: early warning, resilient infrastructure, dryland farming, mangroves, water; modelled, global
World Bank, *Lifelines* **(Hallegatte et al., 2019)**	Each $1 invested in more resilient infrastructure yields about $4 in benefits in low- and middle-income countries	Infrastructure only; average across low- and middle-income countries
Global Commission on Adaptation (Global Commission on Adaptation, 2019)	Warning people 24 hours before a storm or heatwave can cut the damage by about 30%	Depends on warnings reaching and being acted on by people
UNDRR, *Resilience Pays* **(UNDRR, 2025)**	Prevention is systematically underfunded relative to response	Argument and evidence review, not a single ratio
World Bank, *Unbreakable* **(Hallegatte et al., 2017)**	Disaster losses in welfare are far larger than losses in assets; poor households lose most	Shows why returns to protecting poor households are high
H Heuristics scenarios (Section 6)	Best-peer pace rather than current pace would avoid about 117 million child deaths and 71 million household air pollution deaths in 2025–2100	Arithmetic scenarios, not forecasts; no dollar value attached

Source: as cited; H Heuristics summary.

7.3 Why integrated investment may pay more

This creates an important economic proposition: investments that reduce vulnerability to several interconnected threats may generate benefits that exceed those captured by evaluating each intervention independently. A standard appraisal of a rural clinic electrification project counts the health benefit. It does not usually count the school that can then open at night, the phone-charging business, the vaccines that last longer or the cut in diesel pollution. The examples below illustrate how benefits spread across sectors.

- **Cleaner energy** reduces pollution-related health burdens and improves productivity.
- **Climate-resilient infrastructure** reduces future reconstruction and disruption costs.
- **Improved water security** supports agriculture, public health and industrial activity.
- **Digital connectivity** improves access to economic opportunities and public services.
- **Better health care** reduces the socioeconomic consequences of environmental and epidemiological shocks.

The scenarios in Section 6 give a sense of the scale involved. Moving from current to best-peer pace would remove about 88 billion person-years of cooking with polluting fuels, 55 billion person-years without basic sanitation and 23 billion without electricity over 2025–2100. These are not dollar values, and it would be wrong to convert them into dollars without care, but they indicate how much human welfare is at stake in the pace of progress.

7.4 The financing gap

The difficulty is not that prevention is unprofitable but that its payoffs come later than its costs, and the countries with the largest gaps have the least room to borrow. Adaptation needs in developing countries are estimated at $310–365 billion a year by 2035, against about $26 billion of international public adaptation finance in 2023 (UNEP, 2025). Official development assistance fell sharply in 2025 (OECD, 2026). Debt service absorbs a growing share of government revenue in many developing countries, leaving less for upfront investment (UNCTAD, 2025).

Several instruments can help close the gap, and most are already working at some scale. Pre-arranged disaster finance and regional risk pools pay out quickly after a trigger event (Clarke and Dercon, 2016; CCRIF SPC, 2025; African Risk Capacity, 2025). Adaptive social protection lets governments scale up support to households automatically (Bowen et al., 2020). New international mechanisms such as the Global Shield against Climate Risks and the Fund for responding to Loss and Damage aim to direct finance to the most exposed countries (Global Shield against Climate Risks, 2025; FRLD, 2025). Framing resilience investments as infrastructure with measurable reductions in future crisis cost, rather than as ordinary development spending, can open sources of finance that would otherwise be unavailable (Clarke and Dercon, 2016; UNDRR, 2025).

7.5 Testing the case locally

However, these benefits should be demonstrated through country-specific cost-benefit analysis, lifecycle assessments and comparisons with credible alternative investment scenarios. Not every intervention will produce positive returns in every location. A clean cooking programme in a place where families revert to wood after the first month, a flood barrier that is never maintained or a digital system that few can afford will fail to deliver the benefits that averages promise. The evidence from clean cooking is a useful warning: a large randomised trial found that LPG did not reduce severe infant pneumonia when households continued to use traditional stoves as well (HAPIN Investigators, 2024).

SCREENING

Five questions before funding a resilience investment

1. **Which vulnerabilities does it reduce, and how many people are affected?** List every benefit stream, not only the headline one.
2. **What is the credible alternative?** Compare with other uses of the same money, including doing nothing.
3. **Will it be used and maintained?** Test adoption and upkeep, not just installation.
4. **What does it cost over its life?** Include running, repair and replacement costs.
5. **Who gains and who bears the risk?** Check that the poorest households benefit and that debt is manageable.

SECTION 08

Measuring Progress

For Polycrisis Resilience to become an operational framework, its objectives must be translated into measurable indicators. A dashboard of eight dimensions shows how that could work and what a full index would require.

IN BRIEF

- Eight dimensions cover environment, energy, climate, economy, infrastructure, human development, institutions and systemic overlap.
- On the dashboard, regional overall scores run from 19 in Sub-Saharan Africa to 48 in East Asia and the Pacific, against 66 for high-income countries.
- A future Polycrisis Resilience Index should separate exposure, vulnerability and capacity, publish its weights and test its sensitivity.

8.1 Eight dimensions

H Heuristics proposes evaluating progress through eight dimensions. Table 10 lists them with the potential indicators proposed in the framework and the measures this report could use today from public data. Several of the proposed indicators, including adaptation coverage, resilient housing, preparedness and public service continuity, do not yet have consistent cross-country data, which is itself a finding.

Table 10 Eight dimensions of progress and how they can be measured

Dimension	Potential indicators (framework)	Used in this report's dashboard
Environmental	PM2.5 exposure, air quality, water quality	PM2.5 annual mean (World Bank, 2026)
Energy	Electricity access, clean cooking adoption, energy reliability	Electricity access; clean cooking access
Climate	Heat exposure, flood vulnerability, adaptation coverage	INFORM climate hazard score (European Commission JRC, 2026)
Economic	Poverty, productivity, employment, economic diversification	GDP per person; extreme poverty rate
Infrastructure	Resilient housing, transport, sanitation, water access	Sanitation; drinking water; internet use
Human development	Health care access, educational attainment, nutrition	Under-five mortality; primary completion; life expectancy
Institutional	Preparedness, implementation capacity, public service continuity	Government effectiveness; political stability (World Bank, 2025a)
Systemic	Number and severity of overlapping vulnerabilities	Count of worst-fifth flags across the seven challenges

Source: H Heuristics framework (Hughes, 2026a); dashboard indicators from the sources shown.

8.2 A regional dashboard

Figure 13 applies the eight dimensions to the regional groups. Each indicator is converted to a percentile among all 217 economies (100 is best), averaged within each dimension, and then averaged across countries in each region using population weights. The result is an illustration of method, with equal weights and simple averages, not a definitive ranking. Even so, it shows several things. The overall scores run from 19 for Sub-Saharan Africa to 48 for East Asia and the Pacific, against 66 for high-income countries. Sub-Saharan Africa scores low on all dimensions except climate, where its exposure is moderate. South Asia scores worst on environment (5) and climate (3) and in the lower-middle range on the rest. The small island states have the highest environmental score (63, helped by clean ocean air) and among the lowest for energy, infrastructure and human development.

Figure 13 Regions differ in where they are weak: Africa on nearly everything, South Asia on air and climate, islands on infrastructure and services

Eight-dimension dashboard by region, scores 0–100 (higher is better)

	Environ-mental	Energy	Climate	Economic	Infra-structure	Human dev.	Institu-tional	Systemic	Overall
Sub-Saharan Africa	24	14	45	13	13	13	20	13	19
South Asia	5	38	3	29	34	37	38	22	26
Southeast Asia	35	45	9	42	44	50	40	38	38
Latin America & Caribbean	54	47	19	47	54	55	36	54	46
East Asia & Pacific (other)	22	57	0	76	60	71	59	39	48
MENA, Europe & Central Asia	25	67	32	53	51	51	27	40	43
Small island dev. states	63	33	28	43	31	32	37	29	37
Global South	22	42	16	42	40	44	38	30	34
High-income	72	78	22	81	77	77	68	53	66

Source: H Heuristics calculations from World Bank (World Bank, 2026; World Bank, 2025a) and INFORM (European Commission JRC, 2026). Scores are percentile ranks among 217 economies (100 = best; for climate, 100 = least exposed), averaged within each dimension and across countries using population weights. High-income row is for comparison.

8.3 Sensitivity and limits

The framework's proposal states that an index requires carefully selected indicators, transparent weighting, comparable data and sensitivity testing. The dashboard offers two simple tests. First, dropping any one of the eight dimensions leaves the ordering of the six regions almost unchanged (rank correlations of 0.96 or higher). Second, the overall country score is strongly related to income (0.78 correlation with the logarithm of GDP per person), but the link differs by dimension: it is 0.83 for economic and 0.80 for energy, yet only 0.16 for environment and -0.08 for climate. This echoes Section 3: income helps on service and capacity dimensions, but exposure dimensions need their own attention.

The limits are equally important. Regional means hide wide differences: scores among Sub-Saharan African countries range from 10 to 67, and across Global South countries from 10 to 73. Percentile scores show rank, not distance. Equal weights are a choice, not a finding. And several of the most relevant things, such as whether a given house will survive a flood or a clinic stay open during a blackout, are not measured consistently.

8.4 Towards a Polycrisis Resilience Index

An eventual Polycrisis Resilience Index could combine these dimensions to evaluate vulnerability across countries, regions and populations. It should distinguish between exposure to hazards, underlying vulnerability and actual resilience capacity, because a country can have high exposure and high capacity (and be resilient), or low exposure and low capacity (and be fragile). It should be built on principles that make it usable and trusted.

Table 11 Design principles for a Polycrisis Resilience Index

Principle	What it requires
Separate exposure, vulnerability and capacity	Report three scores and combine them only for a headline; never let high exposure be read as low resilience by itself
Transparent weighting	Publish weights and allow users to change them; show results under equal and alternative weights
Comparable, public data	Use indicators available for most countries and years; flag estimated and imputed values
Sensitivity testing	Show how rankings change when indicators or weights change, as in the dashboard above
Ranges, not false precision	Report uncertainty bands and avoid ranking countries that are statistically indistinguishable
Subnational and population detail	Complement national scores with city, district and household measures where data allow
Outcome validation	Test whether the index predicts losses after real shocks, and revise when it does not

Source: H Heuristics; principles follow the framework's description of an index (Hughes, 2026a) and general practice in composite indicators.

SECTION 09

Conclusion and Priorities

The Global South will be central to the trajectory of global polycrisis in this century. Its future severity depends on the threats, and equally on the vulnerability of the people and systems exposed to them, which development can reduce.

IN BRIEF

- Reducing vulnerability is a long-term, cumulative undertaking with its largest payoffs in the mid-century decades.
- Ten priorities follow from the evidence.
- The conclusions rest on public data and arithmetic scenarios, and the limits are stated.

9.1 What the evidence shows

The central proposition of the H Heuristics approach is that the future severity of global polycrisis is not determined exclusively by the threats themselves, but also by the vulnerability of the populations and systems exposed to them. The evidence in this report supports it in four ways. Progress since 2000 shows that vulnerability can be reduced at scale: under-five deaths fell by more than half and extreme poverty by about three quarters. Cross-country data show that services that protect people are strongly tied to development, while pollution and hazard are not, so pathways must be chosen. Regional data show that deprivation and overlapping challenges are concentrated in a small number of places, chiefly Sub-Saharan Africa. And the scenarios show that the pace of progress over the next two decades will decide, for tens of millions of lives, which of two very different centuries unfolds.

9.2 Ten priorities

The following ten priorities summarise what the report suggests for governments, development partners, businesses and communities. They are not ranked in strict order, but the first five are foundations and the last five are enablers.

1. **Close the energy access gap first.** About 655 million people lack electricity and 2.0 billion lack clean cooking; both are upstream of health, education, jobs and digital services. Prioritise distributed solar and storage where it is cheapest and clean cooking solutions people will use exclusively.
2. **Back adaptation that protects people and assets.** Early warnings that reach every community, resilient infrastructure and heat plans have the strongest evidence of returns (Global Commission on Adaptation, 2019; Hallegatte et al., 2019).
3. **Choose clean pathways for industry and cities.** Because air pollution does not fall automatically with income, build clean technology and planning into growth from the start.
4. **Invest in people.** Health, nutrition, education and water and sanitation are direct risk reduction, and their effects accumulate across generations.

5. **Target the places where challenges stack.** Concentrate integrated programmes in the countries with four or more overlapping challenges, mostly in Sub-Saharan Africa, and in fragile small island states.
6. **Spread digital connectivity and technology.** Connectivity enables warnings, payments and services, and shortening the lag in technology diffusion is a major lever.
7. **Build institutions that can use money well.** Fund public administration, planning and coordination across ministries; they are what turns finance into outcomes.
8. **Finance prevention before the crisis.** Expand pre-arranged finance, risk pools, adaptive social protection and concessional lending; close the adaptation finance gap and avoid cutting aid at a time of rising need (UNEP, 2025; OECD, 2026).
9. **Evaluate integrated benefits honestly.** Count every benefit stream, test locally and compare with alternatives before scaling.
10. **Measure and publish.** Develop a transparent index with separate exposure, vulnerability and capacity scores, and fill the data gaps on housing, preparedness and service continuity.

9.3 Limits and what would change the conclusions

Several limits should be kept in mind. The Global South is defined by income classification, which is a convenience; some countries outside it share its vulnerabilities and some within it do not. The indicators are national averages, which hide differences between regions, cities and households. The seven-challenge flags use the worst fifth of countries as a threshold, which is a choice, and moving it changes the totals (the share of people in countries with four or more flags is 8% at a worst-tenth line and 54% at a worst-third line, against 21% at the worst fifth) but not the ordering, in which Sub-Saharan Africa and the small island states always come first. The scenarios assume that a country's recent pace of progress is a reasonable guide to its future pace, that population follows the UN medium projection and that benefits per person stay constant. And the dashboard gives equal weight to dimensions that readers may value differently.

Some findings would change if better evidence became available. If more trials showed that clean cooking fuels did not cut deaths in real-world use, the human gains from the energy priority would be smaller and quality of use more important. If new data showed that adaptation spending in the poorest countries returned less than global averages suggest, the case for risk pooling and social protection (which return their benefits through avoided losses, not new assets) would rise relative to hard infrastructure. And if climate impacts exceeded current projections, the case for building resilience would be stronger but its cost higher.

9.4 A closing thought

Polycrisis Resilience does not promise that crises will not occur. It proposes that what happens when they do occur is within human influence, and that the most reliable way of changing the outcome is steady, coordinated work on the conditions in which people live. The Global South is where that work matters most, because that is where most of the world's people will live and where the gaps between exposure and protection are widest. Vulnerability reduction does not eliminate future risks. It improves the capacity to withstand them, and the decades between now and 2100 are enough to change that capacity profoundly.

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About H Heuristics. H Heuristics is an independent research practice founded by Hunter Hughes. It publishes research on polycrisis, resilience, development and the clean transition, with an emphasis on public data, transparent methods and practical recommendations. Reports are available at researchreports.hheuristics.com.

About this report. This report applies the Polycrisis Resilience framework across the Global South, covering 131 low- and middle-income economies, six development priorities, five regional applications, scenarios to 2100 and a proposed measurement approach.

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