XDI Cross Dependency Initiative

XDI BENCHMARK SERIES

2023 XDI Global Hospital Infrastructure Physical Climate Risk Report

December 2023

XDI

Cross Dependency Initiative

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About XDI

Experts in physical climate risk since 2007

Backed by a team of specialists across science, engineering and software development, XDI (Cross Dependency Initiative) combines asset, climate change and contextual data to determine asset vulnerability, hazard exposure and the likely physical and financial impacts on assets from climate change and extreme weather.

Our data has been helping global leaders price physical climate risk since 2007, making the group the world's longest standing independent specialist in physical climate risk and adaptation analytics. Today, XDI works with governments, corporates and the international finance sector, providing cutting edge analysis to help make informed decisions.

XDI is part of The Climate Risk Group, a group of companies committed to quantifying and communicating the costs of climate change.

XDI believes that physical climate risk data needs to be accessed and understood by everyone, including citizens and civil society organisations. To support this, XDI regularly releases public datasets to generate debate and understanding about the costs of climate change.

XDI's goal is to accelerate action on climate change by embedding physical climate risk data in all decisions

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At the current 10-year mean heating of 1.14°C above pre-industrial levels, climate change is increasingly impacting the health and survival of people worldwide

2023 Lancet Countdown on Health and Climate Change report

Contents

Foreword

Climate exacerbated extreme weather: hospital infrastructure under threat

Extreme winds, torrential rain, flooding, and coastal inundation driven by climate change are already damaging hospital infrastructure and disrupting health care delivery around the world. In 2023, as this report is being written, multiple hospitals are being evacuated due to unprecedented flooding in Tuscany, Italy.

When disasters strike, access to emergency medical care is critical. Yet events like these are preventing communities accessing emergency care, right when they need it most. This damage to hospitals from extreme weather is set to escalate as global temperatures rise.

The future risks to communities from hospital outages will depend on two things: whether the global emission trajectory is changed from its current path; and the extent to which hospitals can be adapted for the much higher severities of extreme events expected with climate change.

The **2023 XDI Global Hospital Infrastructure Datasets** analyse the vulnerability of over 200, 000 hospitals around the world to six climate change hazards including flooding, forest fire, extreme wind and coastal inundation. The analysis focuses on physical damage to building structures, examining how this risk increases as we head to the end of the century. It also quantifies how different emission scenarios can reduce risk and increase resilience.

The **2023 XDI Global Hospital Infrastructure Physical Climate Risk Report** provides a summary of these findings.

For access to the full **2023 XDI Global Hospital Infrastructure Datasets** please contact: media@xdi.systems.

About the datasets

Dataset 1:
Overview of risk to hospital infrastructure by country and region.

This dataset uses two lenses through which to measure risk:

Risk bands

Hospitals are analysed and categorised into 1 of 3 risk bands:

1. **High Risk Hospitals**
2. **Medium Risk Hospitals**
3. **Low Risk Hospitals**

The number of High Risk Hospitals is used to identify countries and regions with the highest number of hospitals (generally those with high populations). Percentage of High Risk Hospitals identifies countries and regions with a proportionally high number of High Risk Hospitals.

Note: this metric will not capture the increase in damage risk to hospital infrastructure within each risk band. Some hospitals are already at high risk, but this risk becomes even more extreme over time.

The measurement is also used to provide:

1. A comparison of risk under two different emission scenarios: RCP 8.5 (high) and RCP 2.6 (low).
2. A comparison or risk over three time intervals: 2020, 2050 and 2100.

Average increase in damage to hospital infrastructure

This metric looks at the increase in risk of damage to all hospital infrastructure around the world from a 1990 baseline until the end of the century.

The measurement is also used to provide:

1. A comparison of risk under two different emission scenarios: RCP 8.5 and RCP 2.6
2. A comparison or risk increase over four time intervals from a 1990 baseline to 2100.

Comparison of risk to hospitals at country and regional levels

For each country and region the following analysis is provided:

- Amount of damage to hospital infrastructure over time
- Number of high, medium and low risk hospitals over time (from 2020)
- Percentage increase in damage to hospital infrastructure over time (from 1990)
- Impact of different emission scenarios.

Dataset 2:
Analysis of 200,216 individual hospitals around the world

- A physical climate risk analysis of over 200,000 individual hospital structures. Each hospital is listed by name, state, country and region. Where names are not available, location co ordinates are provided.
- Each individual hospital is categorised into 1 of 3 risk bands:
  1. **High Risk Hospitals**
  2. **Medium Risk Hospitals**
  3. **Low Risk Hospitals**
- The analysis looks at two different emission scenarios: RCP 8.5 (high) and RCP 2.6 (low) over three time intervals until the end of the century: 2020, 2050, 2100.
- Governments are urged to use this dataset to check for high risk hospitals in their region and conduct further analysis to identify and understand their physical climate risk.
- The names and/or coordinates provided for each individual hospital can be entered into the open data source website healthsites.io in order to view each hospital on a map.

How is risk measured?

Risk Bands

High Risk Hospital

High probability of total or partial shutdown of the hospital within the design life of the building. If this was a residential or commercial building it would be considered uninsurable. In depth analysis of risk to building advised to identify whether adaptation measures could reduce risk or if location unviable.

Medium Risk Hospital

Building is exposed to extreme weather and climate change hazards capable of causing significant damage from extreme weather events - though probabilities or severities are moderate. Adaptation is recommended.

Low Risk Hospital

The building is either not exposed to known extreme weather and climate change related hazards, or the probabilities and severities are very low. The net probability of significant disruption or damage is low and within normal risk tolerances for these hospitals.

Amount of damage to hospital infrastructure: Maximum-to-Date Value-at-Risk (MVAR).

To quantify damage to the built environment from climate change hazards, XDI looks at the annual average loss from extreme weather damage to a property, expressed as a percentage of the replacement cost of that property.

In this report, XDI uses this annual average loss metric to measure the percentage increase in damage risk to a property over time.

Note: for the purposes of this analysis, percentage increase is capped at 1000%.

RCP 8.5 vs RCP 2.6

A Representative Concentration Pathway (RCP) is a greenhouse gas concentration trajectory adopted by the IPCC. Four pathways are used for climate modelling and research and XDI uses these in its analyses.

The RCP 8.5 pathway delivers a temperature increase of around 4.3˚C by 2100, relative to pre-industrial temperatures. RCP 8.5 is contrasted with RCP 2.6, which would deliver a total warming of around 1.8˚C by 2100.

Hazards

Riverine Flooding
Changes in precipitation in a catchment that causes a river to exceed its capacity, inundating nearby areas. Riverine (Fluvial) flooding can damage low-lying building or infrastructure assets.

Surface Water Flooding
Increased frequency of extreme rainfall leading to overland flooding. Surface Water (Pluvial) flooding can damage low-lying building or infrastructure assets.

Coastal Inundation
Sea water flooding due to high tides, wind, low air pressure and waves can damage coastal land, infrastructure and buildings.

Extreme Wind
Changes in wind regimes, sea surface temperature and wind speeds. High-wind conditions that may exceed a building's design specifications.

Forest Fire
A destructive fire that spreads via trees and forest. Flames and heat from burning vegetation can damage buildings and infrastructure. Increased incidence of fire weather due to confluence of days with higher temperatures, high wind speeds and drier conditions.

Cyclone (Incl. Hurricane, Typhoon)
Extreme wind speeds caused by tropical cyclones formed in areas with high sea surface temperatures which may be exacerbated by ocean warming.

Why use RCP 8.5?

Evidence indicates that greenhouse gas emissions are flattening and annual emissions are not tracking RCP 8.5. This is a good sign, but RCP 8.5 is still an appropriate scenario to use in a prudent risk assessment, given that it remains a feasible bound of future levels of warming and impact. RCPs are based on cumulative greenhouse gases in the atmosphere, rather than annual emissions levels and this concentration tracked closest to RCP 8.5 at least up to 2020.

Feedbacks remain highly uncertain and aren't included in all models, so using a higher carbon emission scenario can be used as a proxy to capture low likelihood high-end impacts. Modelling potential worst-case outcomes is important.

Data and analysis in this report

The names and locations of hospitals used in this analysis are taken from healthsites.io, an open data source of health facility data. Data for China was supplemented by using additional data sources.

Countries with a very low number of hospitals or whose hospital data was limited (less than 10 hospitals per country) have not been singled out for focus in the 2023 XDI Global Hospital Infrastructure Climate Risk Report, although their analysis can be found in the full 2023 XDI Global Hospital Infrastructure Datasets.

The purpose of this analysis is to provide a systematic analysis across all hospitals around the world in order to identify trends. The analysis does not take into account individual hospital structures or adaptation measures that may have been introduced. Further analysis is advised to understand the risk of individual structures.

For more information,
view our Methodology.

The impact of extreme weather on hospital infrastructure and health care delivery

Extreme climate events lead to health system disruption in a number of ways. When hospital structures are damaged, they may need to be evacuated, facilities may be closed, power outages may disrupt care, and damaged roads or transit systems may prevent people from getting to health facilities.

When some hospitals are forced to close, others can become stretched beyond their capacity. Overcrowding and the boarding of patients in emergency departments is associated with decreased quality of care. Storms, floods, wildfires, and other extreme events can prevent health professionals from traveling to health care facilities to deliver care, and disruption to their own lives also makes their jobs more challenging, raising the risk of burnout.

These events result in significant human morbidity and mortality.

Increased vulnerability of low and middle income countries

Extreme weather events pose heightened threats to urban health care delivery in low- and middle-income countries. Poor building conditions, unstable power supply, poor sanitation and hygiene, and the built environment reduce access to healthcare for residents of poor urban areas.

Many of these most vulnerable countries do not intend or have the means to conduct climate change assessments, let alone finance adaptation measures to improve the resilience of hospital infrastructure.

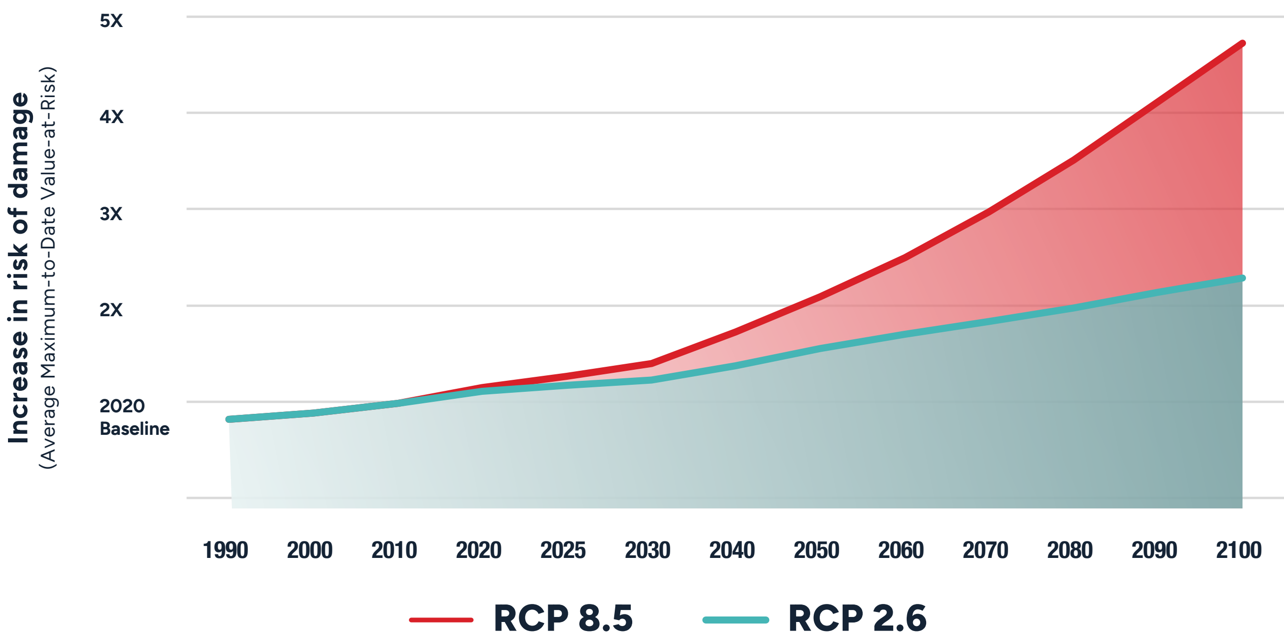
World Overview

200,216 hospitals around the world were analysed for risk of damage from 6 different climate change hazards from 1990 until the end of the century. The risk arising from two different emissions scenarios (i) RCP 8.5 (around 4.3 °C) and RCP 2.6 (1.8 °C or under) was compared.

Findings at a glance

- Without a phase out of fossil fuels, by 2100, 1 in 12 hospitals worldwide will be at high risk of total or partial shutdown from extreme weather events - a total of 16,245 hospitals.
- Without a phase out of fossil fuels, all of these 16,245 hospitals will require adaptation, where suitable. Even with this enormous investment, for many, relocation will be the only option.
- The analysis suggests that the risk of damage to hospitals from extreme weather events has already increased by 41% since 1990 due to greenhouse gas emissions.
- Limiting global warming to 1.8 degrees celsius with a rapid phase out of fossil fuels would halve the damage risk to hospital infrastructure compared to a high emissions scenario.
- If emissions are high, the risk of damage to hospitals around the world from extreme weather will increase more than four-fold (311%) by the end of the century. In a low emissions scenario, this increase in risk is reduced to just 106%
- Even with a rapid decrease in fossil fuels, the risk of damage to hospital infrastructure will still increase by 2100 due to emissions that have already occurred or appear unavoidable. However, a lower emissions scenario will significantly lessen this risk.
- Hospitals located on coastlines and near rivers are most at risk. Today, riverine and surface water flooding dominates the risk of damage to hospitals. Towards the end of the century, coastal inundation rapidly increases (exacerbated by sea-level rise) and becomes the most significant hazard after riverine flooding by 2100.
- Of the 16,245 hospitals identified as high risk by 2100, 71% (11,512) of them are in low and middle income countries.

Graph: Increase in risk of damage to hospital infrastructure over time under different emission scenarios



Impact of different emission scenarios

The table below shows the increase in risk of damage from climate change extreme weather to hospital infrastructure over a time: a comparison of a high emission (RCP 8.5) and low emission (RCP 2.6) scenario.

	# Hospitals analysed	RCP 8.5 # High risk hospitals 2020	RCP 8.5 # High risk hospitals 2050	RCP 8.5 # High risk hospitals 2100	RCP 8.5 % High risk hospitals 2020	RCP 8.5 % High risk hospitals 2050	RCP 8.5 % High risk hospitals 2100
Global	200216	**8609**	**10744**	**16245**	**4.30%**	**5.37%**	**8.11%**

	# Hospitals analysed	RCP 2.6 # High risk hospitals 2050	RCP 2.6 # High risk hospitals 2100	RCP 2.6 % High risk hospitals 2020	RCP 2.6 % High risk hospitals 2050	RCP 2.6 % High risk hospitals 2100
Global	200216	**10043**	**12011**	**4.30%**	**5.02%**	**6.00%**

	# Hospitals analysed	RCP 8.5 % damage risk increase 2020-2050	RCP 8.5 % damage risk increase 2020-2100	RCP 2.6 % damage risk increase 2020-2050	RCP 2.6 % damage risk increase 2020-2100
Global	200216	**82%**	**311%**	**40%**	**106%**

Driving hazards

The table below identifies the main hazards driving damage risk around the world – RCP 8.5.

	RCP 8.5 Driving hazard 2020	RCP 8.5 Driving hazard 2050	RCP 8.5 Driving hazard 2100
Global	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

	# Hospitals analysed	% damage risk increase 1990-2020
Global	200216	41%

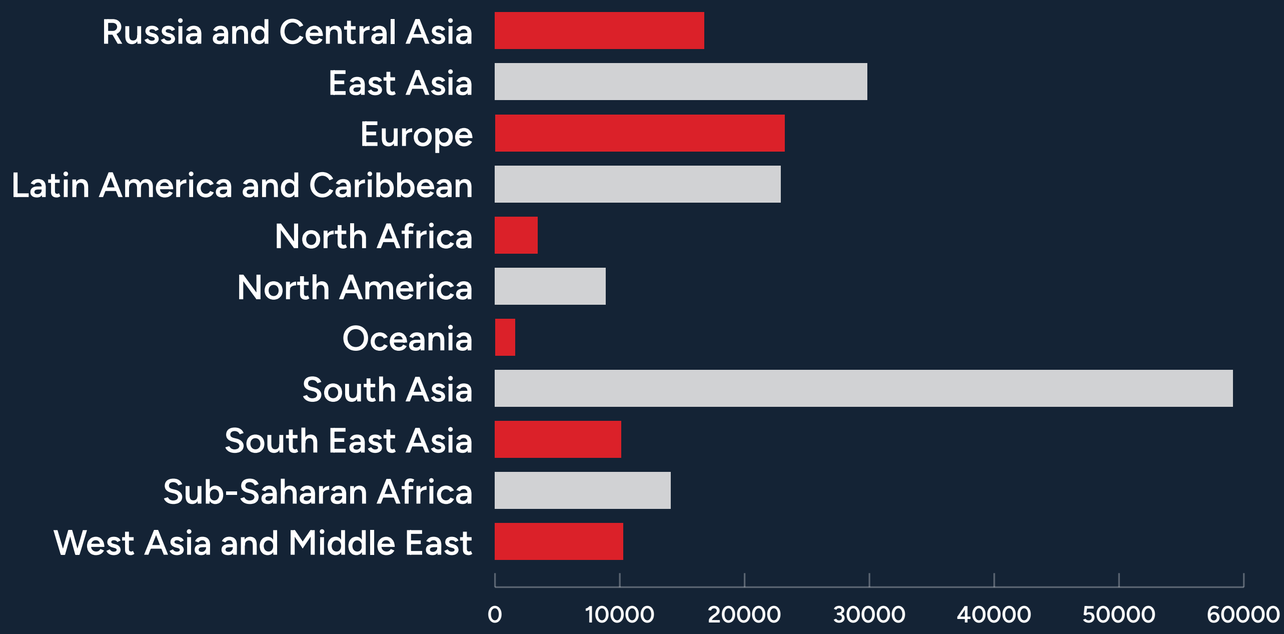
Table: Ranking of countries by number of high risk hospitals - top 50 only.

This table shows rank, country, total number of hospitals analysed, number of hospitals at high risk by 2100, and percentage of hospitals at high risk by 2100.

Rank	Country	# Hospitals analysed	# High risk hospitals by 2100	% High risk hospitals by 2100
1	India	53,473	5,120	9.6%
2	China	8,631	1,302	15.1%
3	Japan	10,554	1,145	10.8%
4	South Korea	9,800	737	7.5%
5	Indonesia	3,628	696	19.2%
6	Brazil	7,187	562	7.8%
7	Philippines	2,057	550	26.7%
8	Russia	13,596	544	4.0%
9	United States	7,820	477	6.1%
10	Nepal	1,632	430	26.3%
11	Argentina	2,698	263	9.7%
12	Vietnam	1,135	263	23.2%
13	México	2,880	222	7.7%
14	Bangladesh	1,244	183	14.7%
15	Nigeria	3,451	157	4.5%
16	Colombia	2,094	150	7.2%
17	Central African Republic	262	149	56.9%
18	Italy	2,527	137	5.4%
19	Ecuador	1,054	124	11.8%
20	Peru	596	119	20.0%
21	Ukraine	3,578	118	3.3%
22	Thailand	1,608	104	6.5%
23	France	2,321	103	4.4%
24	Turkey	1,773	99	5.6%
25	Sri Lanka	826	86	10.4%
26	Iraq	1,766	85	4.8%
27	Germany	2,506	82	3.3%
28	England	1,539	72	4.7%
29	Iran	2,086	70	3.4%
30	Pakistan	1,840	68	3.7%
31	Laos	210	68	32.4%
32	Malaysia	406	67	16.5%
33	Myanmar	626	66	10.5%
34	United Arab Emirates	325	62	19.1%
35	Poland	1,073	57	5.3%
36	Bolivia	729	57	7.8%
37	Haiti	1,327	52	3.9%
38	Romania	911	49	5.4%
39	Kazakhstan	1,132	48	4.2%
40	Australia	1,084	46	4.2%
41	Bulgaria	597	44	7.4%
42	Kenya	926	44	4.8%
43	Canada	1,061	38	3.6%
44	Venezuela	775	36	4.6%
45	Spain	1,118	35	3.1%
46	Uzbekistan	1,067	34	3.2%
47	Kyrgyzstan	427	33	7.7%
48	Georgia	395	30	7.6%
49	Cuba	703	27	3.8%
50	Paraguay	310	27	8.7%

Regional Overview

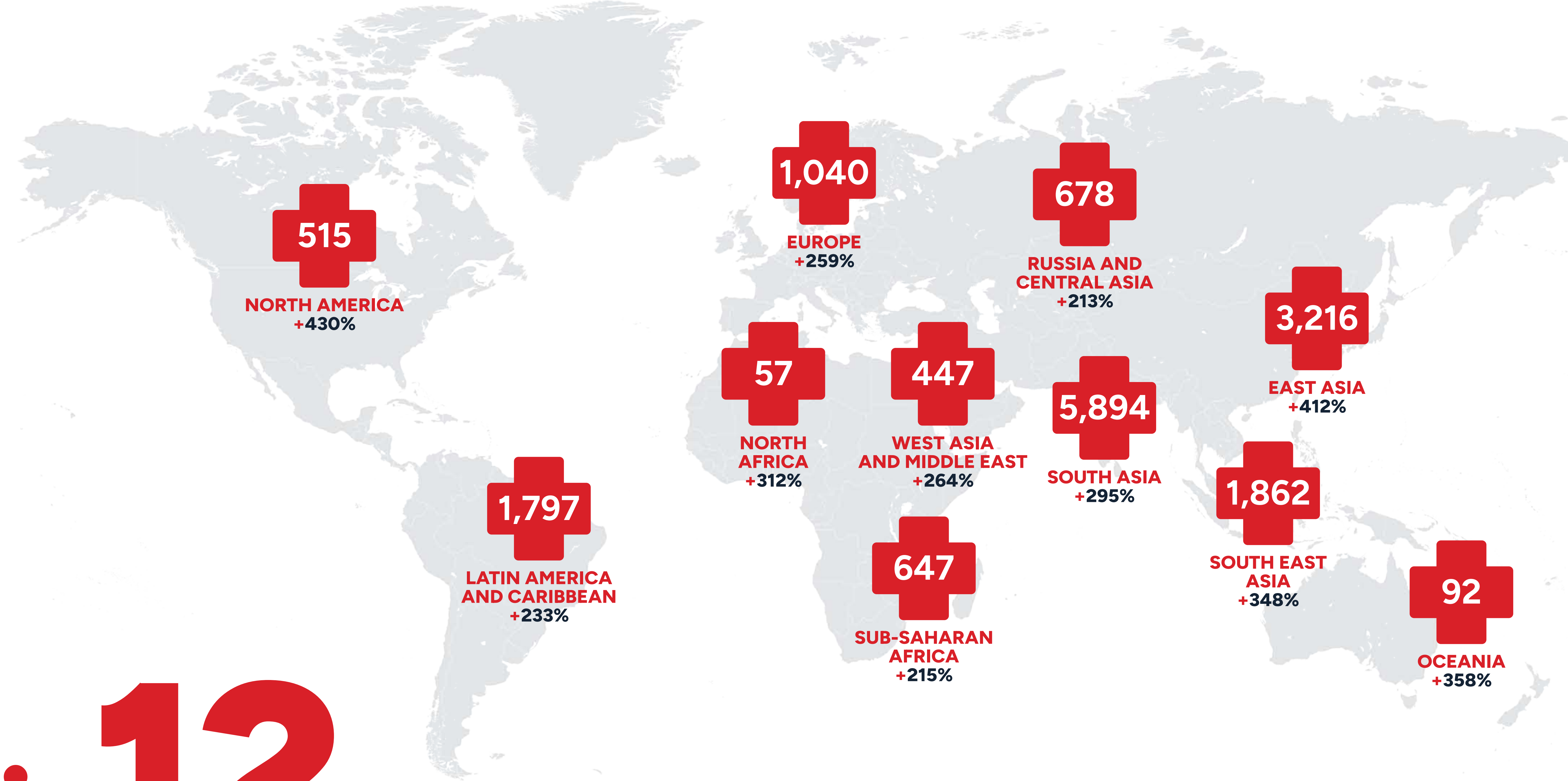
Graph: Number of hospitals analysed per region.



Findings at a glance

- Today, South East Asia has the highest percentage of hospitals at high risk of damage from climate change extreme weather events, with close to 1 in 5 hospitals (18.4%) considered high risk by 2100. It is followed by East Asia (10.78%) and South Asia (9.97%).
- Analysis suggests that South East Asia has already experienced the greatest increase in risk of damage from climate change extreme weather: a 67% increase in risk of damage since 1990 (baseline year).
- South Asia has the highest number of hospitals at risk, reflecting the high population. By 2050, a third of all the most high risk hospitals (3,357) in the world will be in South Asia. By 2100 this increases to 5,894.
- In a comparison of the regions, North America is modelled to experience the greatest increase in risk of damage to all hospital infrastructure by 2100, with a more than five-fold (430%) increase in the amount of damage risk since 2020. It is followed by East Asia, at 412%.
- The global regions with the highest number and proportion of high risk hospitals - South East Asia, East Asia and South Asia - are also the regions where many countries' health systems are already struggling. Vulnerable states could see a complete breakdown in the delivery of healthcare in places where hospitals fail.
- South Asia has most to gain from a lower emissions trajectory: if temperature increases are kept under 1.8 degrees celsius, the increase in damage risk to hospital infrastructure by 2100 is estimated to be just ¼ of what it will be under a high emissions scenario (76% increase in damage risk versus 295%).
- Across all regions, the greatest increase in damage risk is driven by coastal inundation as we head to the end of the century.

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.

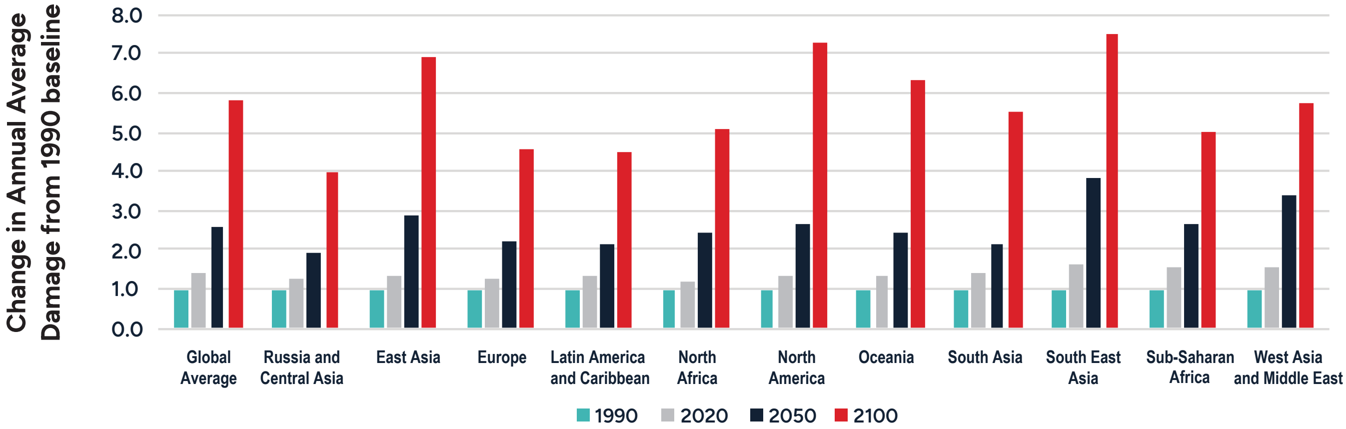


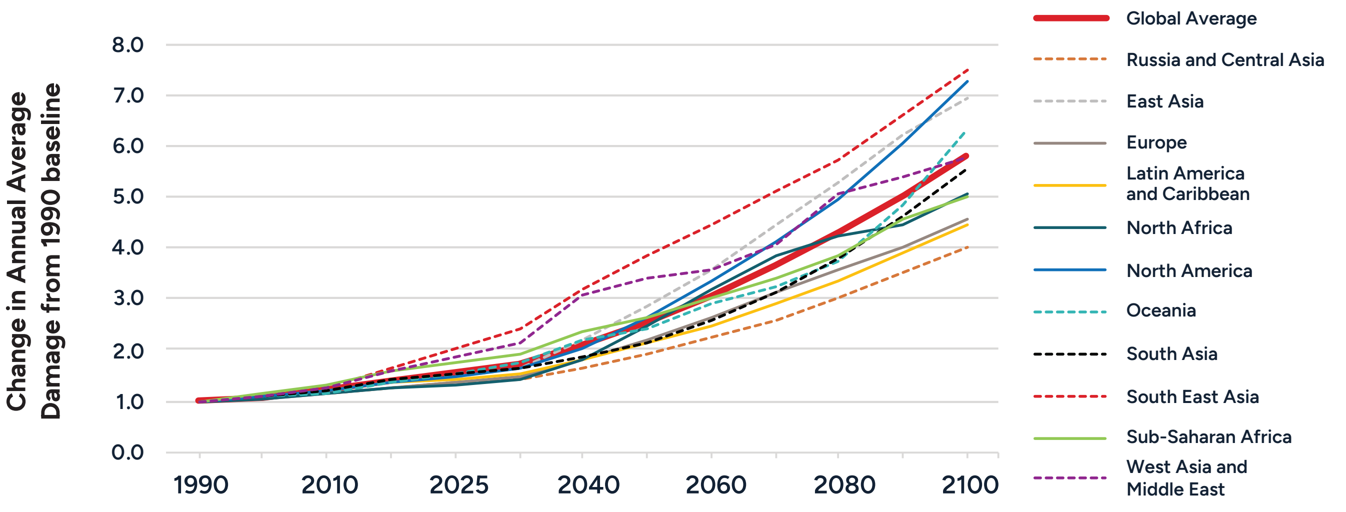
1 in 12

hospitals around the world will be at **high risk** of total or partial shutdown

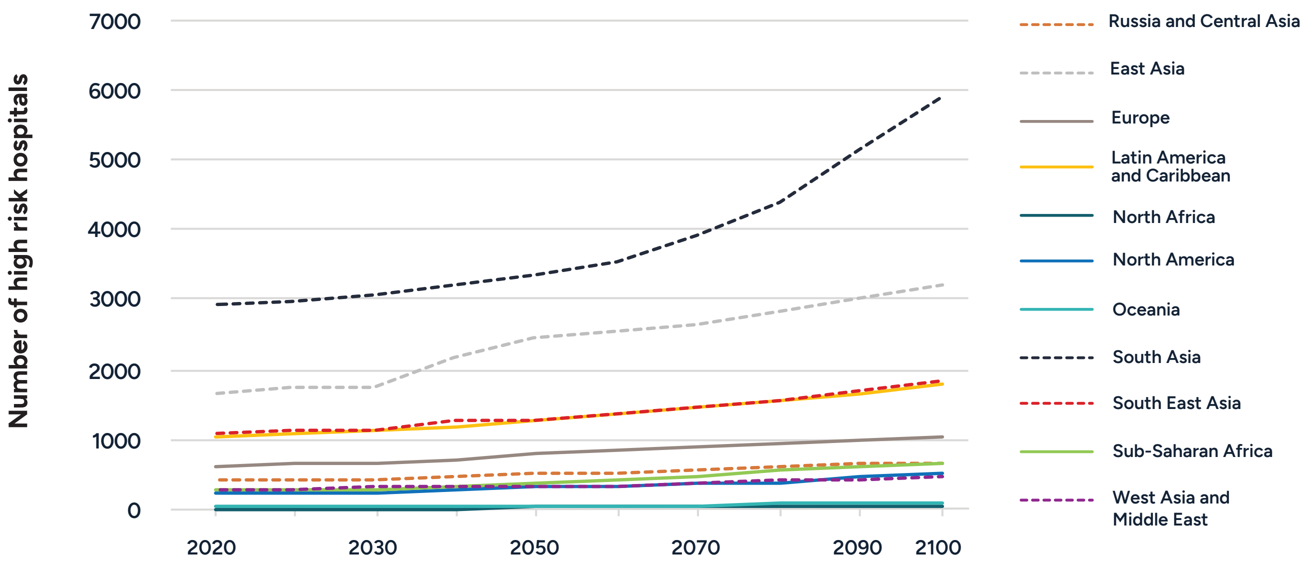
under RCP 8.5 by 2100.

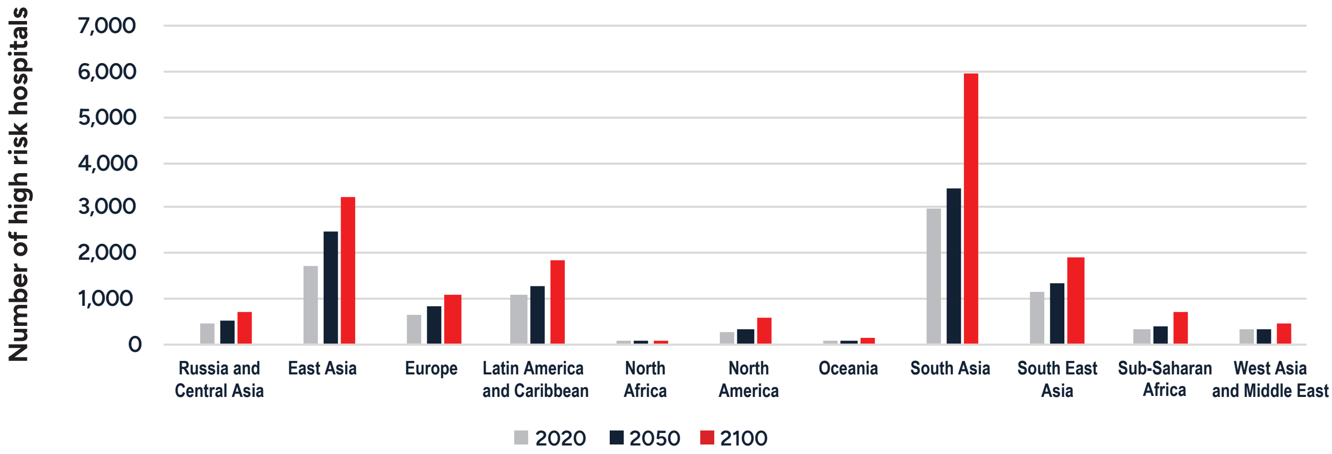
Graph: Increase in **risk of damage** to hospital infrastructure over time RCP 8.5 from a 1990 baseline.



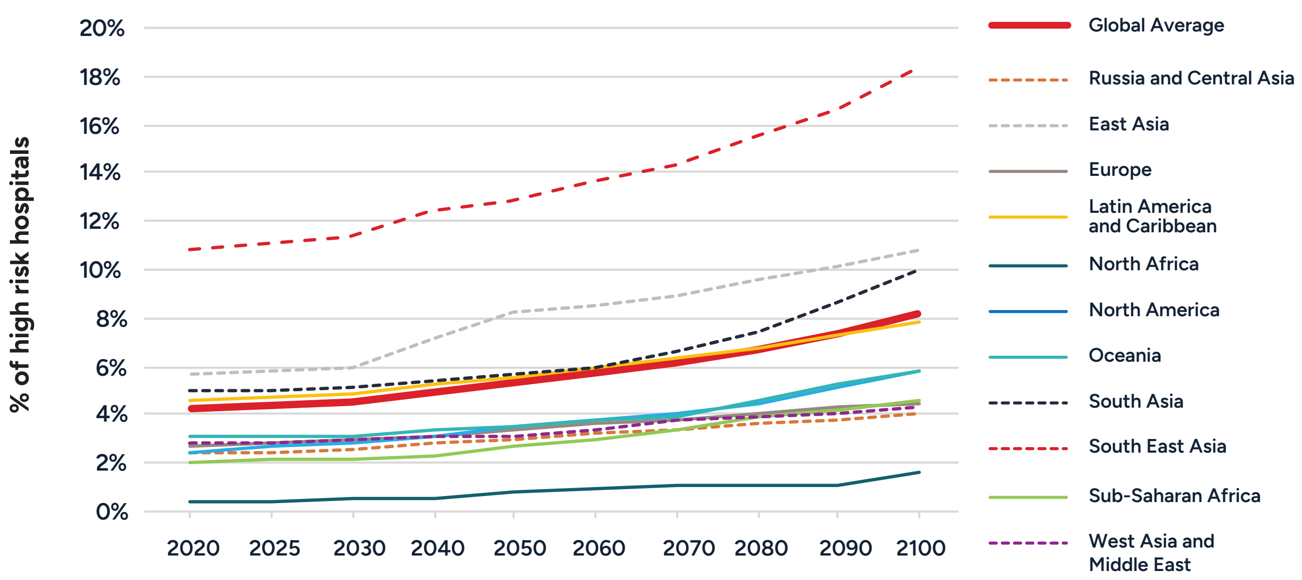


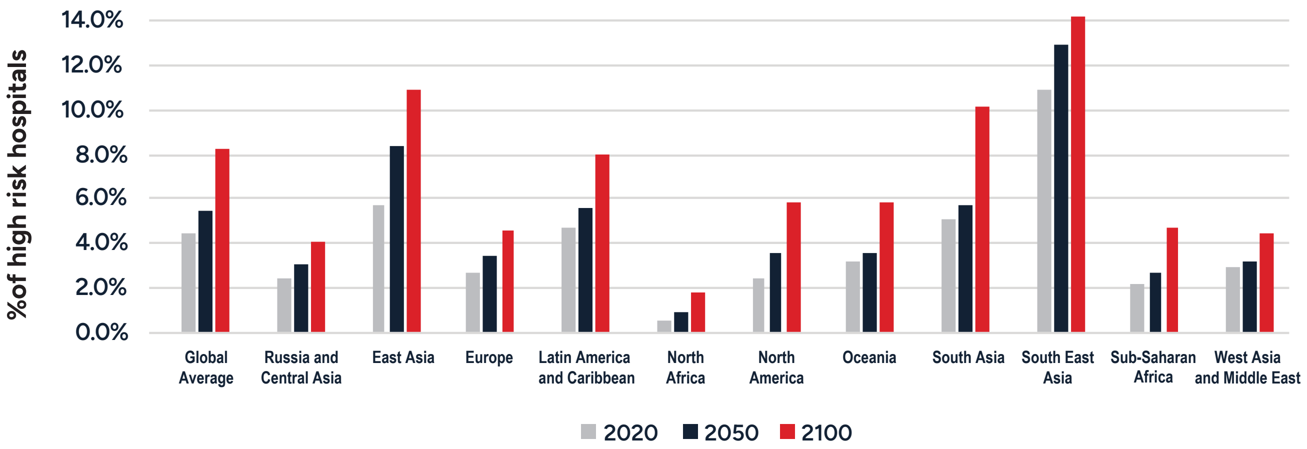
Graph: Increase in **number** of high risk hospitals over time RCP 8.5 from a 2020 baseline





Graph: Increase in percentage of high risk hospitals over time – RCP 8.5.





Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

Region	# Hospitals analysed	RCP 8.5 % damage risk increase 2020-2050	RCP 8.5 % damage risk increase 2020-2100	RCP 2.6 % damage risk increase 2020-2050	RCP 2.6 % damage risk increase 2020-2100
Russia and Central Asia	16779	51%	213%	24%	62%
East Asia	29827	112%	412%	56%	165%
Europe	23198	73%	259%	36%	101%
Latin America and Caribbean	22889	58%	233%	28%	68%
North Africa	3421	101%	312%	52%	144%
North America	8882	92%	430%	45%	180%
Oceania	1600	76%	358%	38%	141%
South Asia	59132	54%	295%	24%	76%
South East Asia	10117	131%	348%	66%	129%
Sub-Saharan Africa	14079	67%	215%	30%	61%
West Asia and Middle East	10289	116%	264%	59%	113%
Other	3	1%	1%	0%	0%

Increase in damage risk 1990-2020

The table right shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Region	% damage risk increase 1990-2020
Russia and Central Asia	28%
East Asia	35%
Europe	27%
Latin America and Caribbean	34%
North Africa	23%
North America	37%
Oceania	37%
South Asia	40%
South East Asia	67%
Sub-Saharan Africa	59%
West Asia and Middle East	58%
Other	8%

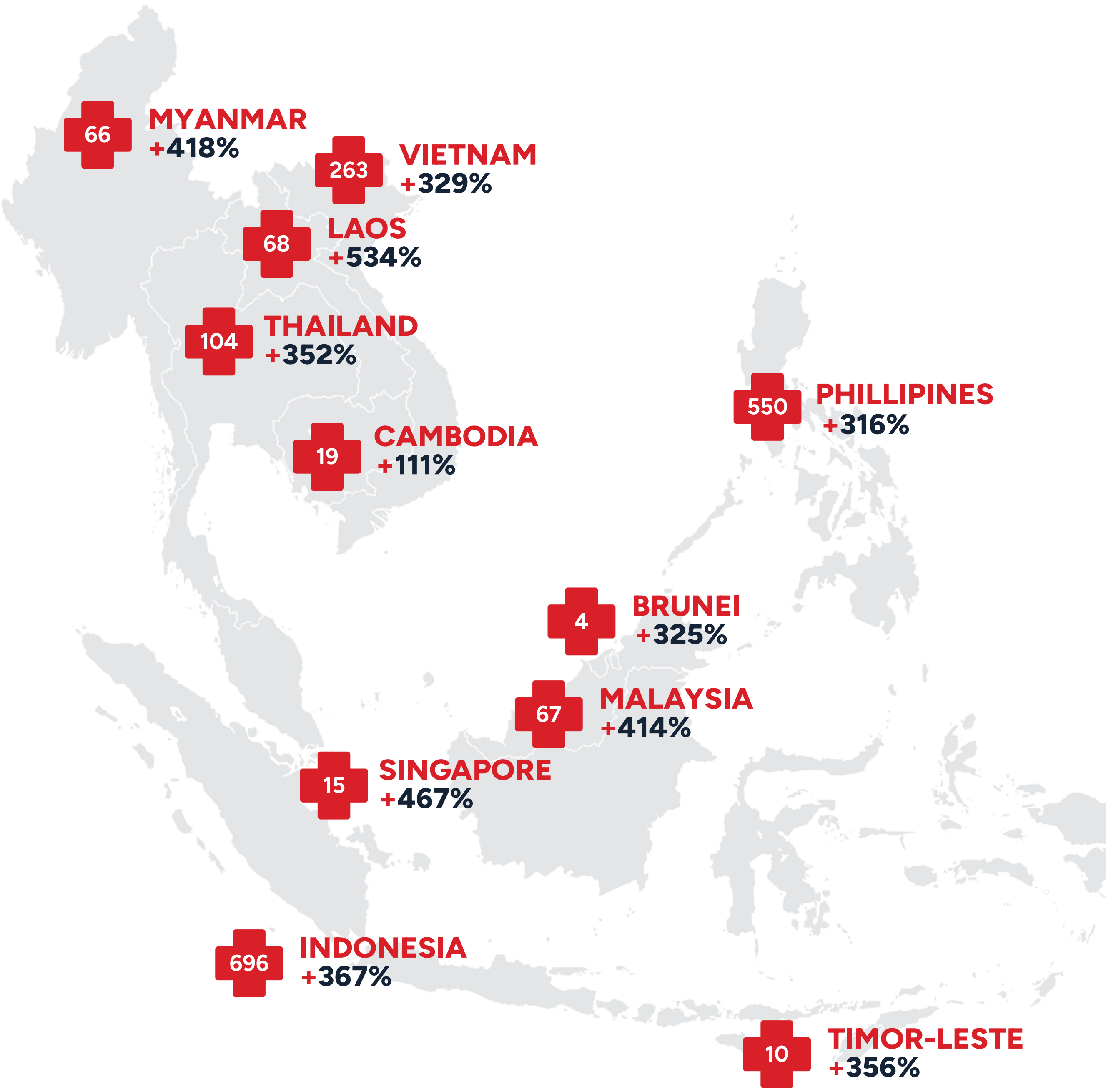
Driving hazards

The table below identifies the main hazards driving damage risk in regions – RCP 8.5.

Region	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Russia and Central Asia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
East Asia	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Europe	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Latin America and Caribbean	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
North Africa	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
North America	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Oceania	• Riverine Flooding • Forest Fire • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Forest Fire	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
South Asia	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Extreme Wind
South East Asia	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Sub-Saharan Africa	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Coastal Inundation	• Riverine Flooding • Forest Fire • Surface Water Flooding
West Asia and Middle East	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Other	• Surface Water Flooding • Extreme Wind • Coastal Inundation	• Surface Water Flooding • Extreme Wind • Coastal Inundation	• Surface Water Flooding • Extreme Wind • Coastal Inundation

SOUTH EAST ASIA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



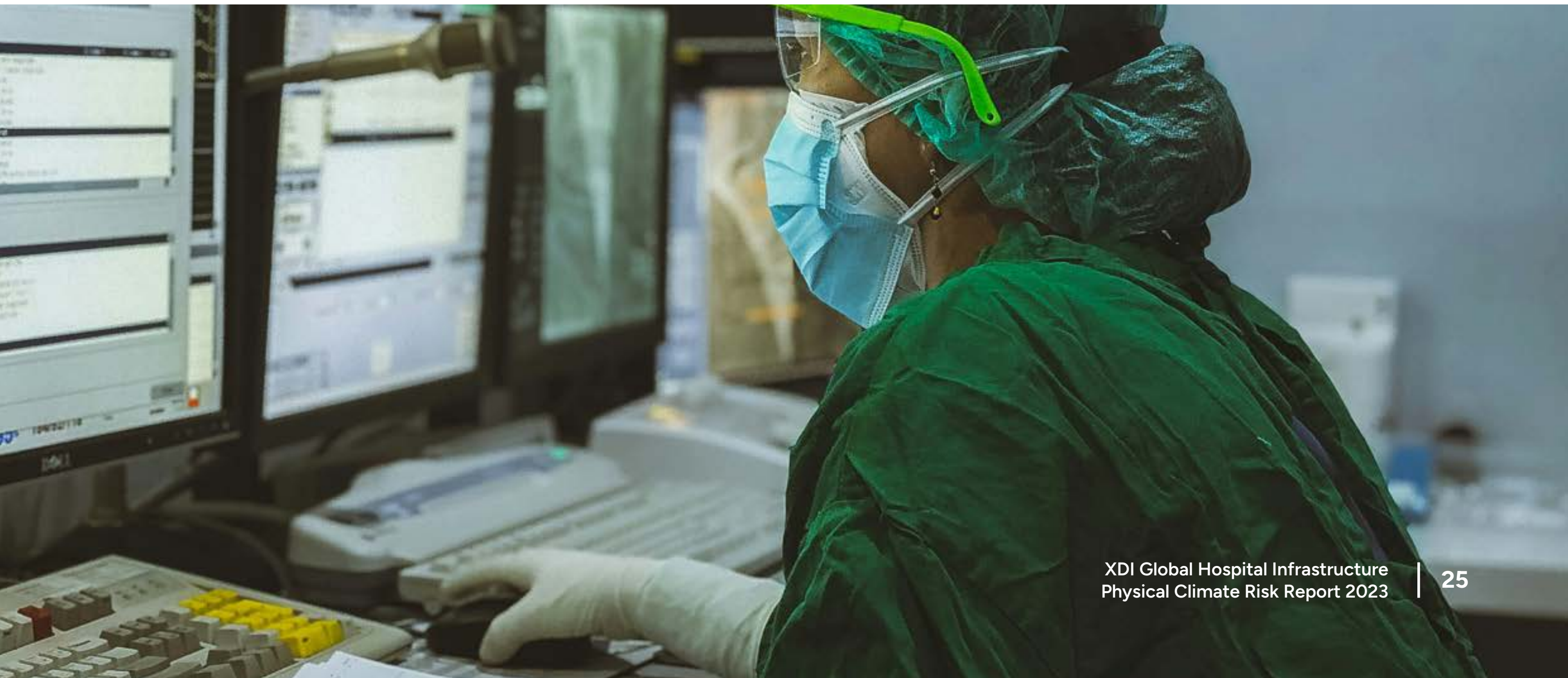
10,117

hospitals analysed

SOUTH EAST ASIA

Findings at a glance: RCP 8.5

- Today, South East Asia has the highest percentage of hospitals at high risk of damage from climate change extreme weather events in the world (10.76%). By 2100 this will increase to almost 1 in 5 hospitals at high risk (18.4%) of total or partial shutdown unless fossil fuel emissions are rapidly reduced.
- The analysis suggests that global warming has already resulted in South East Asia experiencing a 67% increase in risk of damage to hospital infrastructure since 1990.
- Without a rapid reduction in greenhouse emissions, overall risk of damage to hospitals in the region is modelled to more than quadruple by 2100 – a 348% increase.
- Indonesia has the highest number of high risk hospitals in the region, with 509 hospitals already considered at high risk of partial or total shutdown from extreme weather events by 2050. This will increase to 696 hospitals by 2100.
- As low middle income countries, Laos, Vietnam and the Philippines are particularly vulnerable: without a rapid reduction in emissions, by 2100 1 in 4 or more of their hospitals will be unlikely to be able to withstand the type of severe weather events they will be exposed to.
- Laos sees the greatest increase in the percentage of high risk hospitals in the region, with 32.4% at high risk of total or partial shutdown by 2100 – 1 in 3. It will also experience the highest increase in damage risk across all hospitals, a more than five-fold increase.
- After Laos, Singapore is modelled to experience the greatest increase in damage risk by 2100, with a more than five-fold (467%) increase. Although Singapore's hospitals are likely to be built to a higher standard than some others in the region, this still represents a significant increase in risk. This risk increase is reduced to a quarter (124%) if greenhouse gas emissions are rapidly phased out.
- Analysis suggests that regionally, the risk of damage to Vietnam's hospital infrastructure has almost tripled already thanks to climate change, with a 178% increase in damage risk since 1990.
- For most of South East Asia, coastal inundation and flooding are the dominant hazards. Malaysia, Singapore, Laos and Cambodia also see an increase in extreme wind by 2050 and out to the end of the century. By 2050, forest fire is also notable for Laos.



SOUTH EAST ASIA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Brunei	20	4	20.0%
Cambodia	220	19	8.6%
Indonesia	3,628	696	19.2%
Laos	210	68	32.4%
Malaysia	406	67	16.5%
Myanmar	626	66	10.5%
Philippines	2,057	550	26.7%
Singapore	64	15	23.4%
Thailand	1,608	104	6.5%
Timor-Leste	141	10	7.1%
Vietnam	1,135	263	23.2%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Brunei	64%
Cambodia	13%
Indonesia	64%
Laos	50%
Malaysia	56%
Myanmar	24%
Philippines	29%
Singapore	11%
Thailand	41%
Timor-Leste	18%
Vietnam	178%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Brunei	20	129%	325%	67%	75%
Cambodia	220	28%	111%	14%	26%
Indonesia	3,628	164%	367%	83%	145%
Laos	210	110%	534%	57%	128%
Malaysia	406	99%	414%	48%	114%
Myanmar	626	86%	418%	44%	118%
Philippines	2,057	51%	316%	25%	82%
Singapore	64	29%	467%	14%	124%
Thailand	1,608	130%	352%	66%	123%
Timor-Leste	141	28%	356%	14%	127%
Vietnam	1,135	167%	329%	86%	159%

SOUTH EAST ASIA

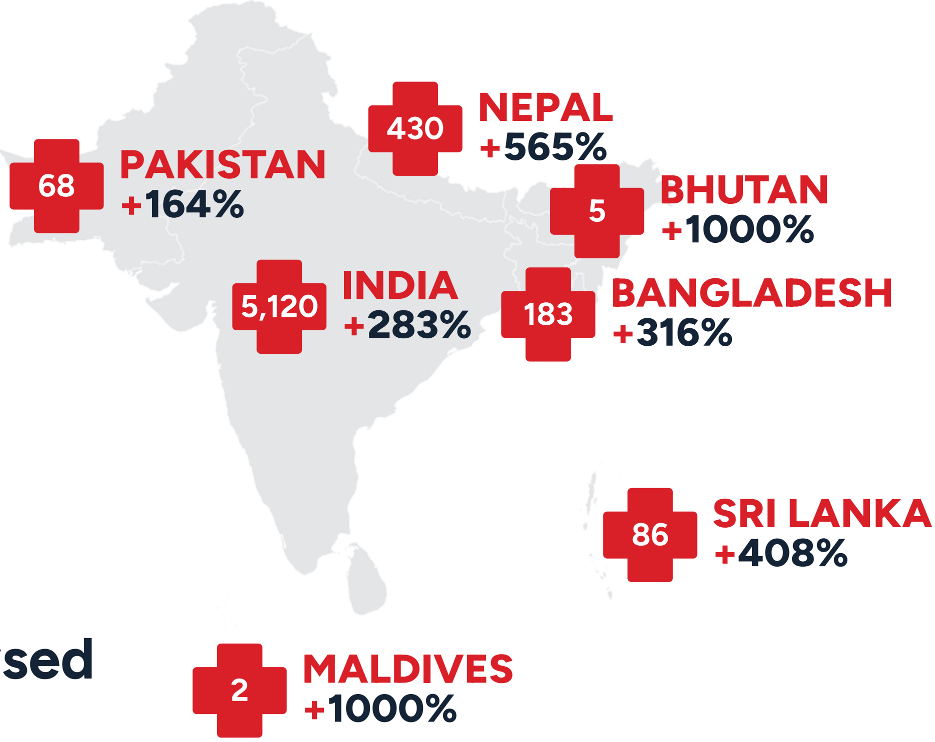
Driving hazards

The table below identifies the main hazards driving damage risk in South East Asia – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Brunei	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind
Cambodia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Indonesia	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Laos	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Extreme Wind
Malaysia	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Myanmar	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Philippines	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Singapore	• Surface Water Flooding • Extreme Wind • Riverine Flooding	• Surface Water Flooding • Extreme Wind • Riverine Flooding	• Surface Water Flooding • Extreme Wind • Coastal Inundation
Thailand	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Timor-Leste	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Vietnam	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding

SOUTH ASIA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



59,132

hospitals analysed

Findings at a glance: RCP 8.5

- South Asia has the highest number of high risk hospitals in the world (most of which are in India), reflecting the high population. By 2050, over 1/3 of all high risk hospitals globally will be in this region. By 2100, 5,894 hospitals in the region will be at high risk of partial or total shutdown from extreme weather events unless fossil fuel emissions are rapidly phased out.
- Analysis suggests South Asia has already experienced a 40% increase in risk of damage from climate change extreme weather events since 1990 due to global warming.
- Without a rapid reduction in greenhouse emissions, the overall risk of damage to hospitals in the region will increase by 295% by 2100 - a four-fold increase.
- Today in India 2,700 of the country's 53,473 hospitals are already at high risk of partial or complete shutdown from extreme weather events. If fossil fuels are not phased out, this will increase to more than 5,100 by the end of the century.
- Nepal has the highest percentage of high riskhospitals in the region, with 1 in 4 (26.3%) at high risk by 2100 unless fossil fuel emissions are rapidly phased out. Analysis suggests Nepal has already experienced a 49% increase in damage risk since 1990 due to global warming.
- Bhutan and the Maldives see an exponential increase in risk to hospital infrastructure as global temperatures rise with an over ten-fold increase by 2100 - the point at which we cap damage increase, as realistically, no building would be maintained in an area exposed to this frequency and severity of extreme weather risk. In Bhutan, this rapid escalation in risk is driven by flooding. In the Maldives, the driving hazard is coastal inundation.
- Driving hazards for the region are mostly coastal inundation and flooding, however extreme wind isalso a notable hazard in countries such as Nepal, Maldives, Bhutan. Nepal's hospital infrastructure isalso at risk from forest fire.

SOUTH ASIA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Bangladesh	1,244	183	14.7%
Bhutan	68	5	7.4%
India	53,473	5,120	9.6%
Maldives	49	2	4.1%
Nepal	1,632	430	26.3%
Pakistan	1,840	68	3.7%
Sri Lanka	826	86	10.4%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Bangladesh	22%
Bhutan	37%
India	41%
Maldives	7%
Nepal	49%
Pakistan	40%
Sri Lanka	47%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Bangladesh	1,244	79%	316%	40%	95%
Bhutan	68	125%	1000%	69%	301%
India	53,473	52%	283%	23%	73%
Maldives	49	1000%	1000%	1000%	1000%
Nepal	1,632	87%	565%	43%	133%
Pakistan	1,840	33%	164%	12%	42%
Sri Lanka	826	74%	557%	35%	142%

SOUTH ASIA

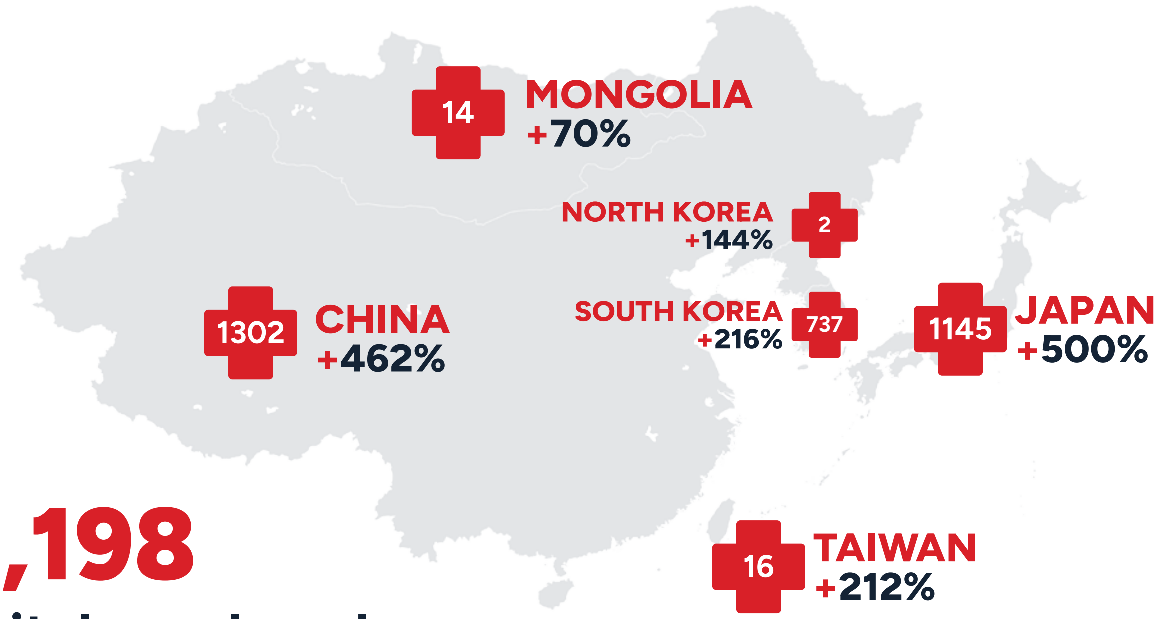
Driving hazards

The table below identifies the main hazards driving damage risk in South Asia – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Bangladesh	• Riverine Flooding • Surface Water Flooding • Forest Fire	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Bhutan	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
India	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Maldives	• Extreme Wind • Cyclone Wind • Coastal Inundation	• Coastal Inundation • Extreme Wind • Cyclone Wind	• Coastal Inundation • Extreme Wind • Cyclone Wind
Nepal	• Forest Fire • Riverine Flooding • Extreme Wind	• Forest Fire • Riverine Flooding • Extreme Wind	• Extreme Wind • Riverine Flooding • Forest Fire
Pakistan	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Sri Lanka	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind

EAST ASIA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



29,198

hospitals analysed

Findings at a glance: RCP 8.5

- Without a rapid reduction in fossil fuel emissions, by 2100 up to 1 in 10 hospitals in East Asia will be at high risk of total or partial shut down due to climate change extreme weather events.
- Analysis suggests that global warming has already resulted in a 35% increase in damage risk from climate change extreme weather in the region since 1990.
- The overall risk of damage to hospital infrastructure in the region will increase by 412% (more than five-fold) by 2100 unless fossil fuel emissions are rapidly phased out. In a low emissions scenario, this risk is reduced to 165%.
- China's hospital infrastructure has the most to lose if global warming goes over 1.8 degrees celsius. Under RCP 8.5:
  - it will have the highest number of high risk hospitals (1,302 by 2100),
  - the highest percentage of high risk hospitals (15.1% by 2100) and
  - will experience an almost six-fold (462%) increase in damage risk across hospital infrastructure by 2100.
  - Under a low emissions scenario this damage risk increase is reduced to 187%.
- Japan is also severely impacted. Up to 1,145 hospitals in Japan could be high risk of complete or partial shutdown by 2100 (more than 1 in 10) and the country is set to experience a 500% (six-fold) increase in risk of damage to its hospital infrastructure by 2100. This risk of damage increase is reduced to 219% in a low emissions scenario.
- Coastal inundation exacerbated by sea-level rise continues to increase in intensity, becoming the region's driving hazard from 2050 onwards. Riverine flooding followed by surface water flooding are the other dominant hazards. Extreme wind is also present.
- Due to the limited China hospital data available on the healthsites.io database, XDI introduced additional datasets for analysis. There still may be a significant number of hospitals in China not captured in this analysis.

EAST ASIA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hos pitals by 2100 RCP 8.5
China	8,631	1,302	15.1%
Japan	10,554	1,145	10.8%
Mongolia	321	14	4.4%
North Korea	46	2	4.3%
South Korea	9,800	737	7.5%
Taiwan	475	16	3.4%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
China	42%
Japan	30%
Mongolia	11%
North Korea	24%
South Korea	32%
Taiwan	18%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
China	8,631	133%	462%	67%	187%
Japan	10,554	142%	500%	74%	219%
Mongolia	321	20%	70%	10%	18%
North Korea	46	38%	144%	18%	33%
South Korea	9,800	37%	216%	15%	61%
Taiwan	475	27%	212%	13%	46%

EAST ASIA

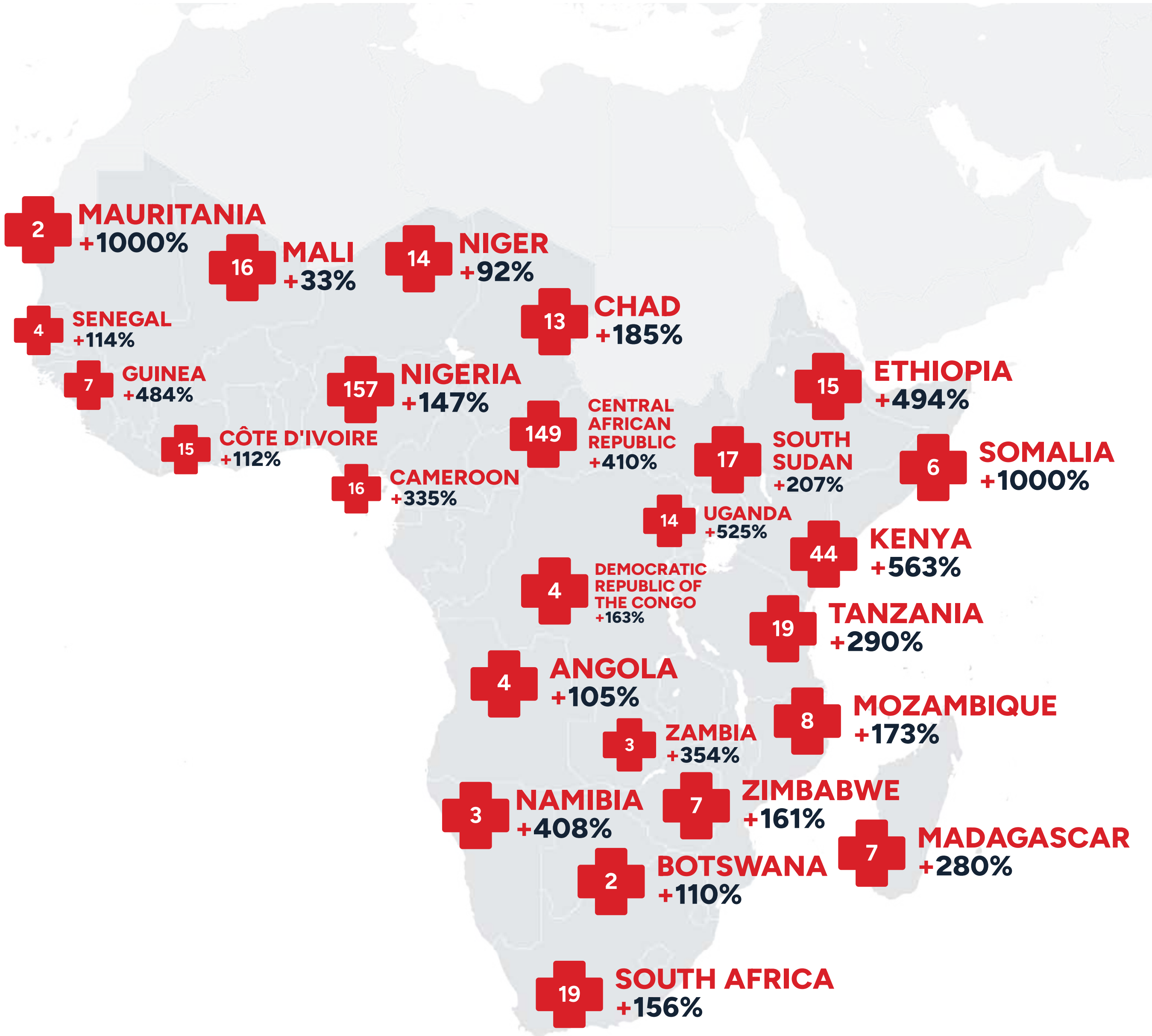
Driving hazards

The table below identifies the main hazards driving damage risk in East Asia – RCP 8.5.

Country	# Hospitals analysed	RCP 8.5 % damage risk increase 2020-2050	RCP 8.5 % damage risk increase 2020-2100	RCP 2.6 % damage risk increase 2020-2050	RCP 2.6 % damage risk increase 2020-2100
China	8,631	133%	462%	67%	187%
Japan	10,554	142%	500%	74%	219%
Mongolia	321	20%	70%	10%	18%
North Korea	46	38%	144%	18%	33%
South Korea	9,800	37%	216%	15%	61%
Taiwan	475	27%	212%	13%	46%

SUB-SAHARAN AFRICA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



14,079

hospitals analysed

*data for all countries is not shown on this map.

View the tables below for more information.

SUB-SAHARAN AFRICA

Findings at a glance: RCP 8.5

- Without a rapid reduction in fossil fuel emissions, by 2100 up to 647 hospitals in the region could be at high risk of total or partial shutdown from extreme weather events. In a low emissions scenario, this number is reduced to 362 high risk hospitals.

- Without a rapid reduction in fossil fuel emissions, the region will experience a three-fold (215%) increase in the risk of damage to hospital infrastructure by 2100. In a low emissions scenario, this increase in damage risk is reduced to 61%.

- Analysis suggests that global warming has already resulted in a 59% increase in damage risk to hospital infrastructure in the region since 1990.

- The Central African Republic (CAR) is one of the most impacted countries in the region.
  - Today, only 5 of its 262 hospitals are considered at high risk of total or partial shutdown from climate change extreme weather events. But without a rapid reduction in fossil fuel emissions, this will increase to 149 hospitals by 2100. In a low emissions scenario this is reduced to just 15 high risk hospitals.
  - In a high emissions scenario, more than half (56%) of CAR's hospitals will be at high risk of total or partial shutdown compared to a global average of 6% - one of the highest percentages of high risk hospitals in the world. In a low emissions scenario, the percentage of high risk hospitals by 2100 is reduced to just 5.73%.
  - Forest fire is the driving hazard in CAR and will remain so until the end of the century.

- In the region, Nigeria currently has the highest number of hospitals at high risk of total or partial shutdown from extreme weather events (126 today). Without a rapid reduction in fossil fuel emissions, this will increase to 157 high risk hospitals by 2100.

- Other countries set to experience a rapid escalation in damage risk (500% or more) to hospital infrastructure by 2100 include:
  - Mauritania
  - Sao Tome and Principe
  - Somalia
  - Rwanda
  - Kenya
  - Uganda

- Today, riverine flooding, forest fire and extreme wind are the driving hazards in the region. Coastal inundation from sea level rise and flooding increase in significance towards the end of the century, although forest fire remains present.

- **Note:** In this report, Sudan analysis is found in the North Africa section.

SUB-SAHARAN AFRICA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Angola	155	4	2.6%
Benin	265	8	3.0%
Botswana	64	2	3.1%
Burkina Faso	407	3	0.7%
Burundi	872	2	0.2%
Cabo Verde	72	-	0.0%
Cameroon	402	16	4.0%
Central African Republic	262	149	56.9%
Chad	159	13	8.2%
Comoros	27	-	0.0%
Côte d'Ivoire	324	15	4.6%
Democratic Republic of the Congo	575	18	3.1%
Djibouti	27	1	3.7%
Equatorial Guinea	10	-	0.0%
Eritrea	20	-	0.0%
Ethiopia	360	15	4.2%
Gabon	53	3	5.7%
Gambia	63	-	0.0%
Ghana	379	7	1.8%
Guinea	141	7	5.0%
Guinea-Bissau	21	7	33.3%
Kenya	926	44	4.8%
Lesotho	42	1	2.4%
Liberia	83	5	6.0%
Madagascar	233	7	3.0%
Malawi	176	6	3.4%
Mali	211	16	7.6%
Mauritania	74	2	2.7%
Mauritius	40	2	5.0%
Mayotte	13	-	0.0%
Mozambique	160	8	5.0%
Namibia	83	3	3.6%
Niger	133	14	10.5%
Nigeria	3,451	157	4.5%
Republic of the Congo	71	8	11.3%
Réunion	18	2	11.1%
Rwanda	78	1	1.3%
São Tomé and Príncipe	16	1	6.3%
Senegal	139	4	2.9%
Seychelles	11	1	9.1%
Sierra Leone	125	5	4.0%
Somalia	53	6	11.3%
South Africa	797	19	2.4%
South Sudan	135	17	12.6%
Swaziland	22	2	9.1%
Tanzania	1,030	19	1.8%
Togo	310	3	1.0%
Uganda	628	14	2.2%
Zambia	188	3	1.6%
Zimbabwe	172	7	4.1%

SUB-SAHARAN AFRICA

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Angola	155	22%	105%	8%	23%
Benin	265	182%	331%	95%	134%
Botswana	64	19%	110%	10%	27%
Burkina Faso	407	32%	60%	11%	13%
Burundi	872	37%	39%	15%	16%
Cabo Verde	72	6%	44%	3%	11%
Cameroon	402	83%	335%	41%	91%
Central African Republic	262	113%	410%	53%	91%
Chad	159	59%	185%	24%	48%
Comoros	27	20%	43%	8%	9%
Côte d'Ivoire	324	16%	112%	6%	20%
Democratic Republic of the Congo	575	32%	163%	16%	39%
Djibouti	27	2%	4%	0%	0%
Equatorial Guinea	10	1%	8%	0%	3%
Eritrea	20	17%	25%	8%	10%
Ethiopia	360	60%	494%	29%	123%
Gabon	53	28%	133%	12%	29%
Gambia	63	13%	22%	4%	4%
Ghana	379	32%	370%	14%	119%
Guinea	141	94%	484%	45%	113%
Guinea-Bissau	21	69%	243%	31%	54%
Kenya	926	81%	563%	42%	143%
Lesotho	42	25%	301%	11%	70%
Liberia	83	71%	333%	37%	77%
Madagascar	233	43%	280%	19%	69%
Malawi	176	67%	252%	32%	58%
Mali	211	19%	33%	6%	7%

SUB-SAHARAN AFRICA

Impact of different emission scenarios - continued.

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Mauritania	74	826%	1000%	490%	972%
Mauritius	40	20%	121%	9%	26%
Mayotte	13	24%	123%	6%	25%
Mozambique	160	44%	173%	19%	32%
Namibia	83	33%	408%	16%	200%
Niger	133	64%	92%	23%	24%
Nigeria	3,451	69%	147%	28%	46%
Republic of the Congo	71	21%	44%	9%	10%
Réunion	18	33%	259%	8%	46%
Rwanda	78	55%	760%	29%	191%
São Tomé and Príncipe	16	80%	1000%	40%	289%
Senegal	139	5%	114%	2%	50%
Seychelles	11	59%	60%	20%	20%
Sierra Leone	125	42%	186%	17%	37%
Somalia	53	27%	1000%	14%	497%
South Africa	797	42%	156%	17%	33%
South Sudan	135	69%	207%	31%	51%
Swaziland	22	59%	349%	28%	75%
Tanzania	1,030	89%	290%	47%	78%
Togo	310	90%	201%	41%	60%
Uganda	628	90%	525%	43%	124%
Zambia	188	81%	354%	40%	89%
Zimbabwe	172	50%	161%	22%	41%

SUB-SAHARAN AFRICA

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Angola	27%
Benin	63%
Botswana	14%
Burkina Faso	37%
Burundi	34%
Cabo Verde	1%
Cameroon	45%
Central African Republic	99%
Chad	61%
Comoros	15%
Côte d'Ivoire	23%
Democratic Republic of the Congo	18%
Djibouti	1000%
Equatorial Guinea	0%
Eritrea	7%
Ethiopia	40%
Gabon	31%
Gambia	14%
Ghana	32%
Guinea	53%
Guinea-Bissau	53%
Kenya	37%
Lesotho	18%
Liberia	25%
Madagascar	30%
Malawi	44%
Mali	28%

Country	% damage risk increase 1990-2020
Mauritania	166%
Mauritius	8%
Mayotte	20%
Mozambique	31%
Namibia	23%
Niger	91%
Nigeria	78%
Republic of the Congo	35%
Réunion	52%
Rwanda	24%
São Tomé and Príncipe	42%
Senegal	6%
Seychelles	1000%
Sierra Leone	41%
Somalia	9%
South Africa	32%
South Sudan	58%
Swaziland	29%
Tanzania	36%
Togo	135%
Uganda	57%
Zambia	47%
Zimbabwe	40%

SUB-SAHARAN AFRICA

Driving hazards

The table below identifies the main hazards driving damage risk in Sub-Sahran Africa – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Angola	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Benin	• Forest Fire • Riverine Flooding • Coastal Inundation	• Coastal Inundation • Forest Fire • Riverine Flooding	• Coastal Inundation • Forest Fire • Riverine Flooding
Botswana	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Burkina Faso	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Burundi	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Cabo Verde	• Surface Water Flooding • Extreme Wind • Cyclone Wind	• Extreme Wind • Surface Water Flooding • Cyclone Wind	• Extreme Wind • Surface Water Flooding • Cyclone Wind
Cameroon	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Forest Fire
Central African Republic	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding
Chad	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Forest Fire
Comoros	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Cyclone Wind

SUB-SAHARAN AFRICA

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Côte d'Ivoire	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Extreme Wind
Democratic Republic of the Congo	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Forest Fire	• Riverine Flooding • Forest Fire • Surface Water Flooding
Djibouti	• Coastal Inundation • Extreme Wind • Riverine Flooding	• Coastal Inundation • Extreme Wind • Riverine Flooding	• Coastal Inundation • Riverine Flooding • Extreme Wind
Equatorial Guinea	• Extreme Wind • Coastal Inundation • Coastal Inundation	• Extreme Wind • Coastal Inundation • Coastal Inundation	• Extreme Wind • Coastal Inundation • Coastal Inundation
Eritrea	• Extreme Wind • Cyclone Wind • Coastal Inundation	• Extreme Wind • Cyclone Wind • Coastal Inundation	• Extreme Wind • Cyclone Wind • Coastal Inundation
Ethiopia	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Forest Fire
French Southern Territories	• Extreme Wind • Coastal Inundation • Coastal Inundation	• Extreme Wind • Cyclone Wind • Coastal Inundation	• Extreme Wind • Cyclone Wind • Coastal Inundation
Gabon	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Gambia	• Forest Fire • Surface Water Flooding • Extreme Wind	• Forest Fire • Surface Water Flooding • Extreme Wind	• Forest Fire • Surface Water Flooding • Extreme Wind
Ghana	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Coastal Inundation • Forest Fire
Guinea	• Forest Fire • Extreme Wind • Surface Water Flooding	• Forest Fire • Extreme Wind • Surface Water Flooding	• Forest Fire • Extreme Wind • Surface Water Flooding

SUB-SAHARAN AFRICA

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Guinea-Bissau	• Forest Fire • Extreme Wind • Surface Water Flooding	• Forest Fire • Extreme Wind • Surface Water Flooding	• Forest Fire • Extreme Wind • Surface Water Flooding
Kenya	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Lesotho	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Forest Fire • Extreme Wind
Liberia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Madagascar	• Surface Water Flooding • Extreme Wind • Riverine Flooding	• Surface Water Flooding • Extreme Wind • Riverine Flooding	• Surface Water Flooding • Extreme Wind • Riverine Flooding
Malawi	• Forest Fire • Riverine Flooding • Extreme Wind	• Forest Fire • Riverine Flooding • Extreme Wind	• Forest Fire • Riverine Flooding • Extreme Wind
Mali	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Mauritania	• Coastal Inundation • Extreme Wind • Riverine Flooding	• Coastal Inundation • Extreme Wind • Riverine Flooding	• Coastal Inundation • Extreme Wind • Riverine Flooding
Mauritius	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Cyclone Wind
Mayotte	• Extreme Wind • Riverine Flooding • Cyclone Wind	• Extreme Wind • Riverine Flooding • Cyclone Wind	• Extreme Wind • Cyclone Wind • Riverine Flooding
Mozambique	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Surface Water Flooding • Riverine Flooding

SUB-SAHARAN AFRICA

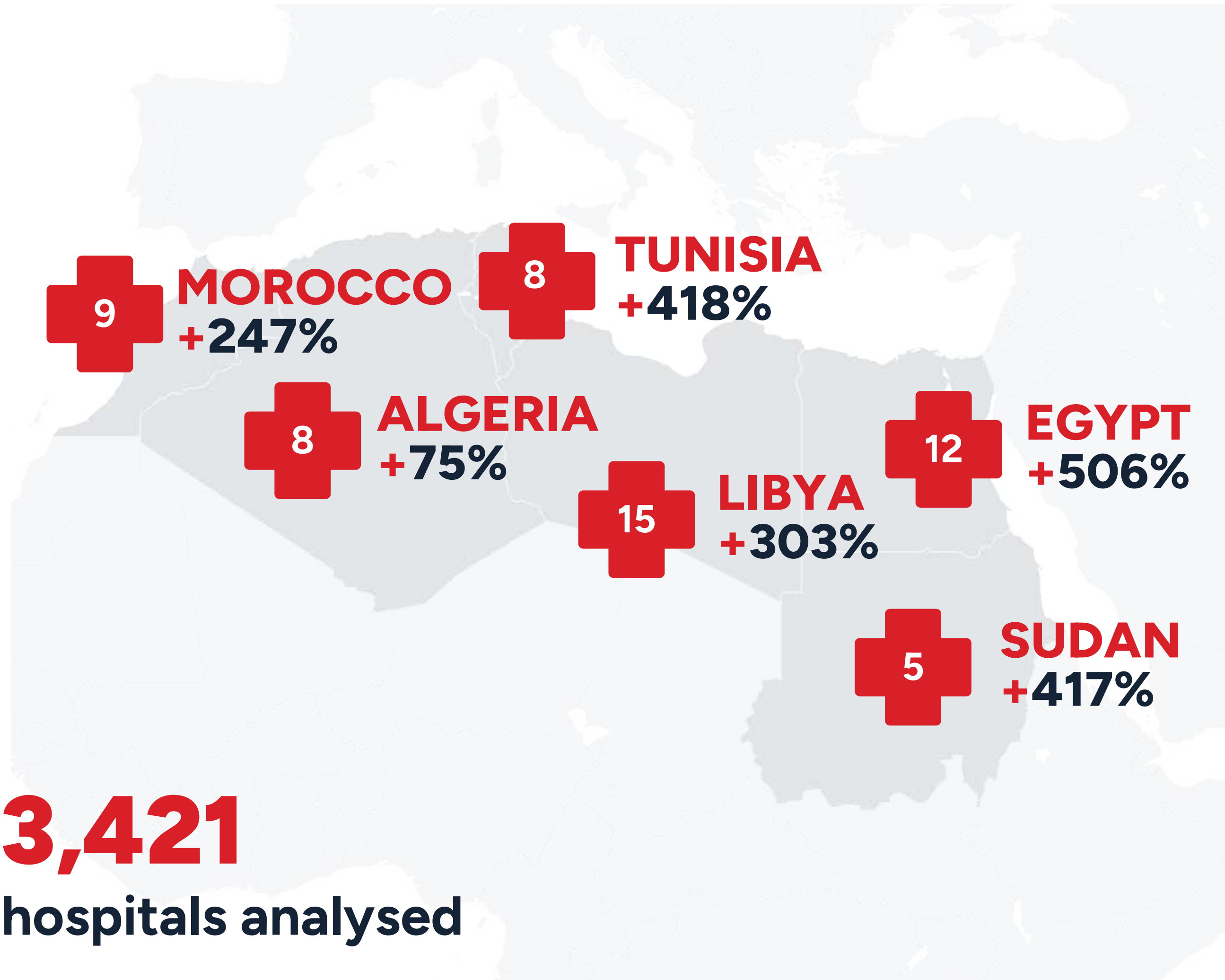
Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Namibia	• Riverine Flooding • Extreme Wind • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Niger	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Nigeria	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Republic of the Congo	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Réunion	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind
Rwanda	• Extreme Wind • Riverine Flooding • Coastal Inundation	• Extreme Wind • Riverine Flooding • Coastal Inundation	• Riverine Flooding • Extreme Wind • Coastal Inundation
São Tomé and Príncipe	• Surface Water Flooding • Extreme Wind • Coastal Inundation	• Surface Water Flooding • Extreme Wind • Coastal Inundation	• Surface Water Flooding • Extreme Wind • Coastal Inundation
Senegal	• Riverine Flooding • Forest Fire • Extreme Wind	• Riverine Flooding • Forest Fire • Extreme Wind	• Coastal Inundation • Riverine Flooding • Forest Fire
Seychelles	• Coastal Inundation • Extreme Wind • Surface Water Flooding	• Coastal Inundation • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Extreme Wind
Sierra Leone	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Surface Water Flooding • Forest Fire • Riverine Flooding
Somalia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Surface Water Flooding

SUB-SAHARAN AFRICA

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
South Africa	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding
South Sudan	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding
Swaziland	• Forest Fire • Extreme Wind • Coastal Inundation	• Forest Fire • Extreme Wind • Coastal Inundation	• Forest Fire • Extreme Wind • Coastal Inundation
Tanzania	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Togo	• Coastal Inundation • Riverine Flooding • Forest Fire	• Coastal Inundation • Forest Fire • Riverine Flooding	• Forest Fire • Coastal Inundation • Riverine Flooding
Uganda	• Forest Fire • Extreme Wind • Riverine Flooding	• Forest Fire • Riverine Flooding • Extreme Wind	• Forest Fire • Surface Water Flooding • Riverine Flooding
Zambia	• Forest Fire • Extreme Wind • Surface Water Flooding	• Forest Fire • Extreme Wind • Surface Water Flooding	• Forest Fire • Extreme Wind • Surface Water Flooding
Zimbabwe	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding

NORTH AFRICA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



3,421

hospitals analysed

Findings at a glance: RCP 8.5

- North Africa has the lowest number and percentage of high risk hospitals in the world at just 1.67% by 2100 in a high emissions scenario.
- Without a rapid reduction in fossil fuel emissions, it will, however, still experience a notable increase in damage risk to hospital infrastructure - more than four-fold (312%) by the end of the century. This risk is reduced to 144% in a low emissions scenario.
- Analysis suggests the region has already experienced a 23% increase in risk of damage to hospital infrastructure due to global warming.
- Without a rapid reduction in fossil fuel emissions, Tunisia, Egypt, and Sudan face the greatest increases in damage risk by 2100 (418%, 506%, 417%). This risk is reduced to 200% or less in a low emissions scenario.
- Coastal inundation, riverine flooding and extreme wind are the driving hazards for the region, with coastal inundation becoming more dominant over time.
- **Note:** South Sudan is in the Sub-Saharan Africa section.

NORTH AFRICA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Algeria	1,138	8	0.7%
Egypt	501	12	2.4%
Libya	859	15	1.7%
Morocco	393	9	2.3%
Sudan	330	5	1.5%
Tunisia	196	8	4.1%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Algeria	11%
Egypt	40%
Libya	9%
Morocco	6%
Sudan	40%
Tunisia	72%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Algeria	1,138	10%	75%	4%	16%
Egypt	501	189%	506%	100%	255%
Libya	859	23%	303%	12%	146%
Morocco	393	23%	247%	12%	114%
Sudan	330	149%	417%	76%	156%
Tunisia	196	308%	418%	166%	218%

NORTH AFRICA

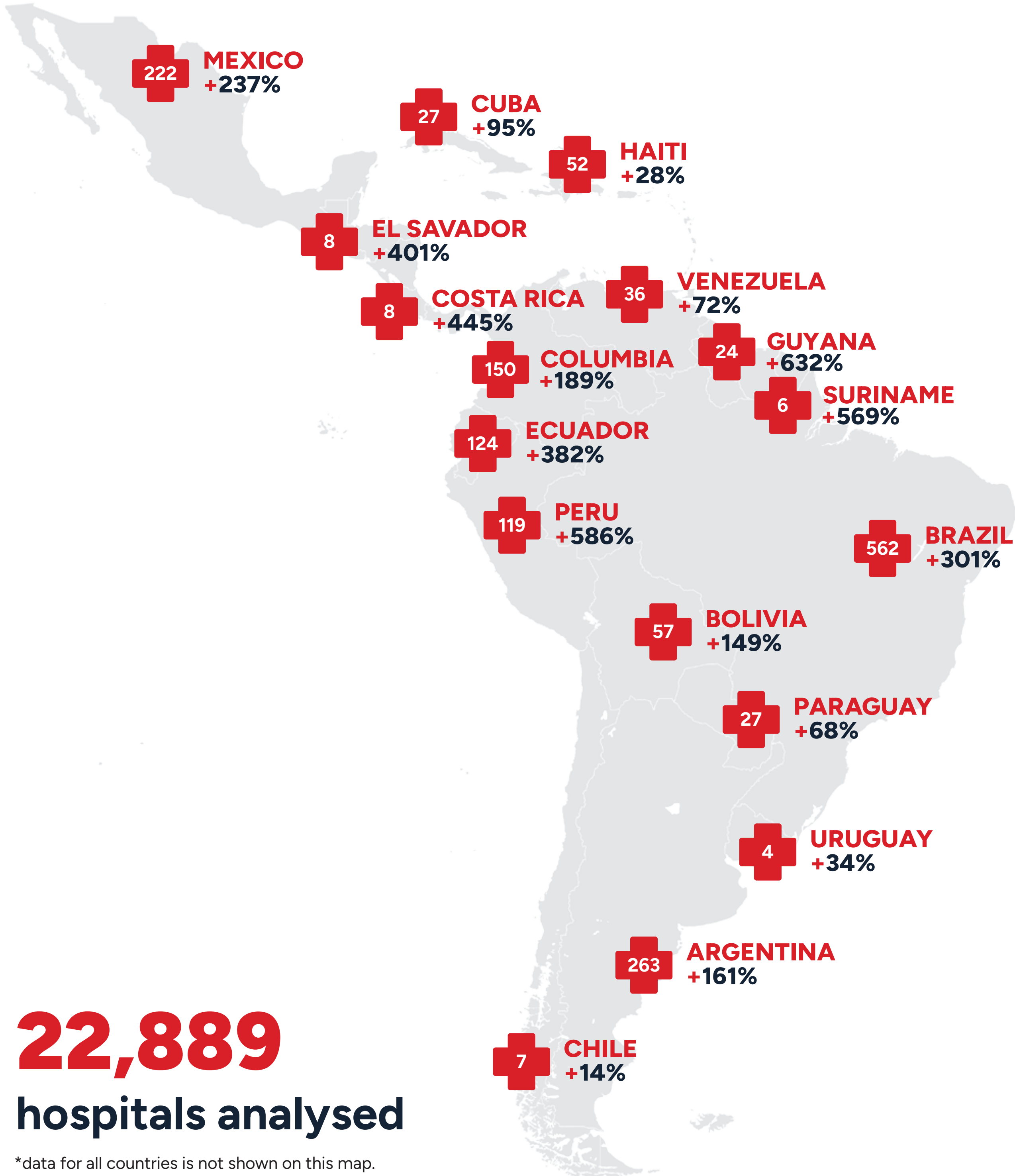
Driving hazards

The table below identifies the main hazards driving damage risk in North Africa – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2050
Algeria	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Extreme Wind • Forest Fire
Egypt	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Libya	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Morocco	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Coastal Inundation	• Coastal Inundation • Riverine Flooding • Extreme Wind
Sudan	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Tunisia	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind

LATIN AMERICA AND CARIBBEAN

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



22,889

hospitals analysed

*data for all countries is not shown on this map.

View the tables below for more information.

LATIN AMERICA AND CARIBBEAN

Findings at a glance: RCP 8.5

- Without a rapid reduction in fossil fuel emissions, by 2100 up to 1,797 hospitals in the region could be at high risk of total or partial shutdown from extreme weather events.
- Without a rapid reduction in fossil fuel emissions, the region will experience a three-fold (233%) increase in the risk of damage to hospital infrastructure by 2100. In a low emissions scenario, this increase in damage risk is reduced by more than 2/3 - to 68%.
- Analysis suggests that global warming has already resulted in a 34% increase in damage risk to hospitals in the region since 1990. In Panama and Venezuela, damage risk has already more than doubled.
- Brazil has the highest number of hospitals that will become high risk by 2100 (562) followed by Argentina (263) and Mexico (222).
- Guyana will experience the greatest increase in damage risk (2020-2100) in the region – 632% reduced to 306% in a low emissions scenario.
- Peru, Suriname, Panama, El Salvador, Ecuador and Costa Rica will all experience increases in damage risk of 400% or more.
- Without rapid emissions reductions, 39.3% of Guyana's hospitals will be at high risk by 2100. In Peru, up to 1 in 5 of their 596 hospitals will be at high risk by 2100.
- Riverine flooding, surface water flooding and coastal inundation are driving hazards for the region.
- **Note:** only countries with 10 or more hospitals are included in the report analysis. For analysis of hospitals in those countries please refer to the datasets.

LATIN AMERICA AND CARIBBEAN

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Argentina	2,698	263	9.7%
Bahamas	14	-	0.0%
Belize	18	-	0.0%
Bolivia	729	57	7.8%
Brazil	7,187	562	7.8%
Chile	440	7	1.6%
Colombia	2,094	150	7.2%
Costa Rica	99	8	8.1%
Cuba	703	27	3.8%
Dominican Republic	346	16	4.6%
Ecuador	1,054	124	11.8%
El Salvador	165	8	4.8%
French Guiana	11	4	36.4%
Guadeloupe	23	-	0.0%
Guatemala	276	24	8.7%
Guyana	61	24	39.3%
Haiti	1,327	52	3.9%
Honduras	182	3	1.6%
Jamaica	40	3	7.5%
Martinique	24	-	0.0%
México	2,880	222	7.7%
Nicaragua	213	4	1.9%
Panama	120	12	10.0%
Paraguay	310	27	8.7%
Peru	596	119	20.0%
Puerto Rico	110	14	12.7%
Saint Lucia	10	-	0.0%
Suriname	17	6	35.3%
Trinidad and Tobago	147	19	12.9%
Uruguay	137	4	2.9%
Venezuela	775	36	4.6%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Argentina	14%
Bahamas	4%
Belize	6%
Bolivia	39%
Brazil	29%
Chile	2%
Colombia	28%
Costa Rica	36%
Cuba	8%
Dominican Republic	78%
Ecuador	64%
El Salvador	25%
French Guiana	23%
Guadeloupe	20%
Guatemala	24%
Guyana	36%
Haiti	29%
Honduras	19%
Jamaica	9%
Martinique	4%
México	40%
Nicaragua	24%
Panama	100%
Paraguay	20%
Peru	76%
Puerto Rico	10%
Saint Lucia	3%
Suriname	36%
Trinidad and Tobago	35%
Uruguay	8%
Venezuela	117%

LATIN AMERICA AND CARIBBEAN

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

Country	# Hospitals analysed	RCP 8.5 % damage risk increase 2020-2050	RCP 8.5 % damage risk increase 2020-2100	RCP 2.6 % damage risk increase 2020-2050	RCP 2.6 % damage risk increase 2020-2100
Argentina	2,698	22%	161%	10%	45%
Bahamas	14	32%	94%	18%	33%
Belize	18	22%	33%	11%	12%
Bolivia	729	41%	149%	16%	33%
Brazil	7,187	70%	301%	35%	85%
Chile	440	4%	14%	2%	3%
Colombia	2,094	53%	189%	27%	54%
Costa Rica	99	65%	445%	31%	101%
Cuba	703	15%	95%	7%	21%
Dominican Republic	346	30%	90%	10%	22%
Ecuador	1,054	114%	382%	58%	104%
El Salvador	165	55%	401%	27%	96%
French Guiana	11	7%	85%	1%	36%
Grenada	6	9%	15%	1%	1%
Guadeloupe	23	3%	11%	0%	0%
Guatemala	276	68%	198%	36%	50%

LATIN AMERICA AND CARIBBEAN

Impact of different emission scenarios - continued.

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Guyana	61	168%	632%	87%	306%
Haiti	1,327	18%	28%	7%	7%
Honduras	182	56%	166%	29%	38%
Jamaica	40	11%	13%	6%	6%
Martinique	24	1%	2%	0%	0%
México	2,880	62%	237%	29%	62%
Nicaragua	213	53%	241%	28%	55%
Panama	120	174%	421%	92%	162%
Paraguay	310	22%	68%	9%	14%
Peru	596	157%	586%	84%	180%
Puerto Rico	110	0%	141%	0%	65%
Saint Lucia	10	0%	1%	0%	0%
Suriname	17	64%	569%	29%	265%
Trinidad and Tobago	147	2%	2%	0%	0%
Uruguay	137	11%	34%	4%	7%
Venezuela	775	24%	72%	8%	32%

LATIN AMERICA AND CARIBBEAN

Driving hazards

The table below identifies the main hazards driving damage risk in Latin America and Caribbean – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Argentina	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Bahamas	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind
Belize	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind
Bolivia	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding	• Riverine Flooding • Forest Fire • Surface Water Flooding
Brazil	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Chile	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Colombia	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Costa Rica	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Cuba	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Dominican Republic	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Ecuador	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Surface Water Flooding • Coastal Inundation

LATIN AMERICA AND CARIBBEAN

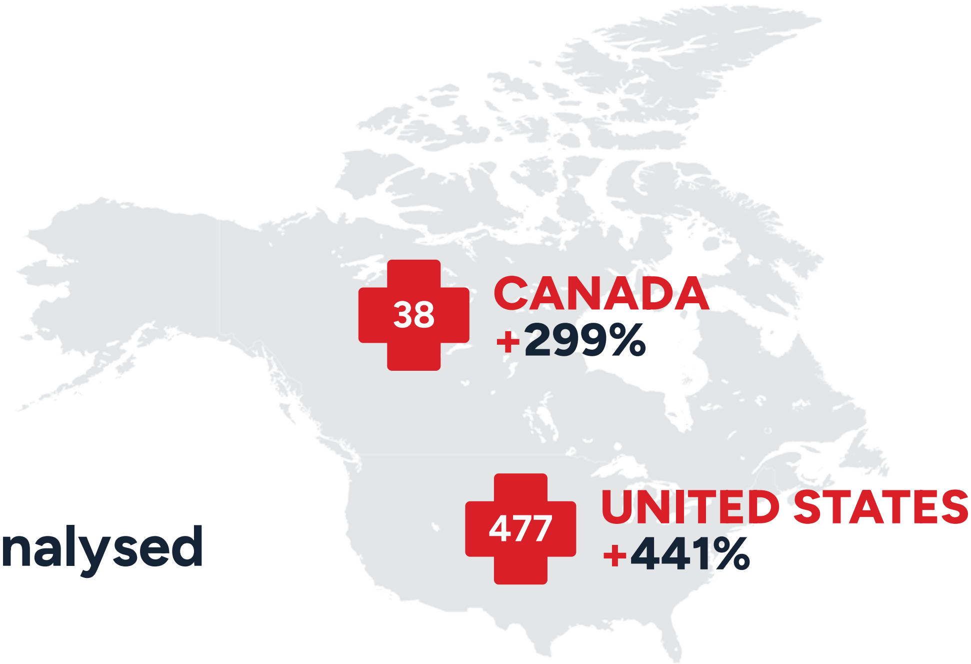
Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
El Salvador	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
French Guiana	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Guadeloupe	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Cyclone Wind
Guatemala	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Guyana	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Haiti	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Honduras	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Jamaica	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Martinique	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
México	• Riverine Flooding • Surface Water Flooding • Forest Fire	• Riverine Flooding • Surface Water Flooding • Forest Fire	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Nicaragua	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Panama	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding

LATIN AMERICA AND CARIBBEAN

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Paraguay	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding	• Forest Fire • Riverine Flooding • Surface Water Flooding
Peru	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Puerto Rico	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Saint Lucia	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind
Suriname	• Surface Water Flooding • Riverine Flooding • Coastal Inundation	• Surface Water Flooding • Riverine Flooding • Coastal Inundation	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Trinidad and Tobago	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Uruguay	• Forest Fire • Surface Water Flooding • Riverine Flooding	• Surface Water Flooding • Forest Fire • Riverine Flooding	• Surface Water Flooding • Forest Fire • Riverine Flooding
Venezuela	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding

NORTH AMERICA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



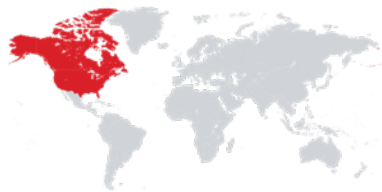
8,882

hospitals analysed

Findings at a glance: RCP 8.5

- In a global comparison of the regions, North America is modelled to experience the greatest increase in risk of damage to hospital infrastructure from climate change extreme weather events between 2020-2100, with the amount of damage increasing more than five-fold (430%) in a high emissions scenario. With a rapid phase out of fossil fuel emissions this increase in damage risk is reduced to 180%.
- Without rapid emissions cuts, seven states in North America face an exponential increase in damage risk to hospital infrastructure (1000% or more) by 2100 in hospitals not built specifically to withstand severe weather events. These states are New Brunswick, Nunavut, Delaware, Florida, Maryland, New Jersey, South Carolina.
- Without a rapid reduction in fossil fuel emissions, by the end of the century 515 hospitals in North America could be at high risk of total or partial shutdown due to extreme weather events.
- Across the region, Florida will have the highest number of high risk hospitals by 2100 in a high emissions scenario (83), followed by Louisiana (47), California (34), Texas (28) and New York (24).
- Without a rapid reduction in fossil fuel emissions, by 2100, up to 1 in 4 Louisiana hospitals could be high risk of total or partial shutdown due to extreme weather events (25%) followed by Nunavut (18.18%) Florida (17.15%) and Alaska (14.29%).
- In the United States, coastal inundation is driving most of the increase in damage risk, followed by riverine and surface water flooding. By 2100 forest fire is the driving hazard in a number of states, including New Hampshire, Michigan, Wisconsin, Minnesota and Missouri.
- In Canada, the greatest increases in risk to hospital infrastructure by 2100 will be seen in New Brunswick, Nunavut, Newfoundland and Labrador and British Columbia, with increases in damage risk of between (371-1000%) in a high emissions scenario. Whilst the driving hazard for most of these is coastal inundation, there is also an increase in extreme wind. Forest fire becomes the dominant driving hazard in Manitoba.

NORTH AMERICA



High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Canada	1,061	38	3.6%
United States	7,820	477	6.1%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Canada	23%
United States	38%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Canada	1,061	44%	299%	21%	96%
United States	7,820	96%	441%	47%	187%

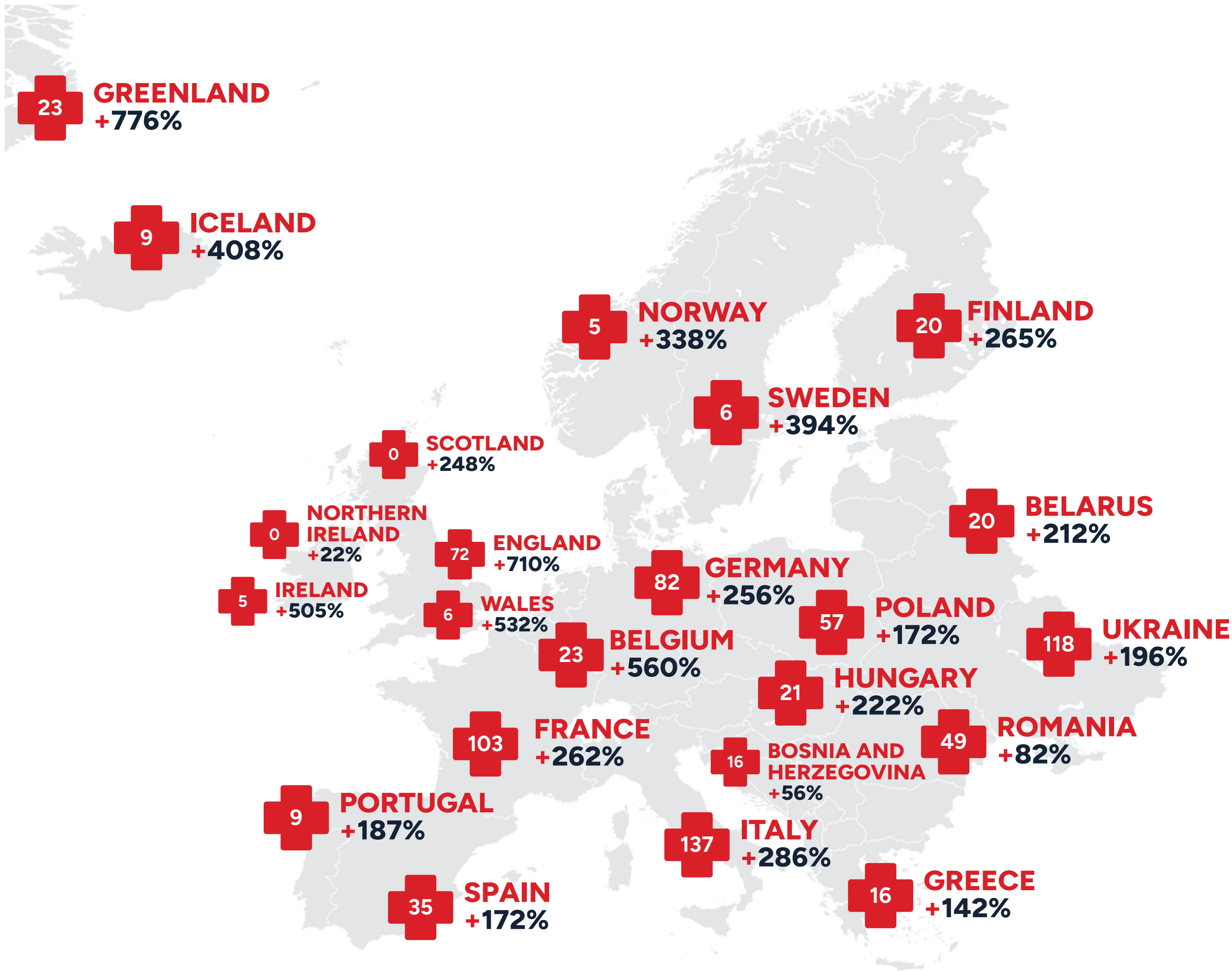
Driving hazards

The table below identifies the main hazards driving damage risk – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Canada	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
United States	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding

EUROPE

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



23,198

hospitals analysed

*data for all countries is not shown on this map.

View the tables below for more information.

EUROPE

Findings at a glance: RCP 8.5

- Without a rapid phase out of fossil fuels, by 2100 Europe could have up to 1,040 hospitals at high risk of total or partial shutdown from extreme weather events.
- The overall risk of damage to hospitals in the region from climate change extreme weather events is modelled to increase by 259% by 2100 - almost four-fold. Rapid emission cuts could lessen this increase in damage risk to 101%.
- Analysis suggests that global warming has already resulted in a 27% increase in risk of damage to hospital infrastructure in Europe since 1990.
- By 2100, Italy will have the highest number of hospitals at high risk of total or partial shutdown (137), followed by Ukraine (118), France (103), Germany (82) and England (72).
- Without a rapid phase out of fossil fuels, the number of high risk hospitals in England and Germany could almost double between now and 2100.
- Without a rapid phase out of fossil fuels, Denmark, Monaco, Albania, Greenland, England, Belgium, Wales and Ireland could experience an exponential (500-1000%) increase in damage risk to hospital infrastructure by 2100.
- Analysis suggests Greece has experienced the greatest increase in risk of damage to hospital infrastructure from climate change in Europe to date, with an 83% increase in risk of damage since 1990. England, Greenland, Iceland follow.
- Like most regions, coastal inundation and flooding are driving hazards, however modelling suggests that extreme wind also increases in a number of countries.

EUROPE

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Albania	101	6	5.9%
Andorra	11	1	9.1%
Austria	191	4	2.1%
Belarus	865	18	2.1%
Belgium	295	23	7.8%
Bosnia and Herzegovina	94	16	17.0%
Bulgaria	597	44	7.4%
Croatia	149	12	8.1%
Czechia	364	5	1.4%
Denmark	171	12	7.0%
England	1,539	72	4.7%
Estonia	57	-	0.0%
Finland	401	20	5.0%
France	2,321	103	4.4%
Germany	2,506	82	3.3%
Greece	413	16	3.9%
Greenland	21	12	57.1%
Hungary	366	21	5.7%
Iceland	31	9	29.0%
Ireland	198	5	2.5%
Italy	2,527	137	5.4%
Kosovo	238	13	5.5%
Latvia	140	7	5.0%
Lithuania	189	9	4.8%
Luxembourg	17	-	0.0%
Malta	15	-	0.0%
Moldova	351	14	4.0%
Montenegro	56	-	0.0%
Netherlands	188	13	6.9%
North Macedonia	135	18	13.3%
Northern Ireland	41	-	0.0%
Norway	154	5	3.2%
Poland	1,073	57	5.3%
Portugal	372	9	2.4%
Romania	911	49	5.4%
Scotland	182	-	0.0%
Serbia	265	17	6.4%
Slovakia	210	20	9.5%
Slovenia	117	19	16.2%
Spain	1,118	35	3.1%
Sweden	194	6	3.1%
Switzerland	284	7	2.5%
Ukraine	3,578	118	3.3%
Wales	128	6	4.7%

EUROPE

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Albania	101	33%	909%	15%	374%
Andorra	11	25%	64%	12%	15%
Austria	191	29%	93%	12%	23%
Belarus	865	13%	212%	6%	51%
Belgium	295	185%	560%	98%	275%
Bosnia and Herzegovina	94	20%	56%	9%	13%
Bulgaria	597	24%	99%	10%	37%
Croatia	149	86%	187%	40%	71%
Czechia	364	17%	80%	6%	19%
Denmark	171	102%	1000%	50%	468%
England	1,539	257%	710%	137%	345%
Estonia	57	16%	36%	5%	6%
Finland	401	23%	265%	7%	89%
France	2,321	72%	262%	35%	100%
Germany	2,506	31%	256%	14%	104%
Greece	413	83%	142%	39%	64%
Greenland	21	258%	776%	138%	392%
Hungary	366	14%	222%	5%	50%
Iceland	31	329%	408%	179%	203%
Ireland	198	19%	505%	9%	185%
Italy	2,527	108%	286%	54%	117%
Kosovo	238	30%	85%	13%	18%
Latvia	140	11%	298%	4%	97%
Lithuania	189	32%	331%	15%	103%
Luxembourg	17	3%	7%	0%	1%
Malta	15	30%	38%	16%	17%
Moldova	351	9%	91%	2%	14%
Monaco	6	88%	1000%	43%	292%
Montenegro	56	15%	92%	5%	15%

EUROPE

Impact of different emission scenarios - continued.

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Netherlands	188	75%	321%	39%	147%
North Macedonia	135	13%	61%	5%	12%
Northern Ireland	41	5%	22%	2%	4%
Norway	154	22%	338%	12%	85%
Poland	1,073	24%	172%	10%	54%
Portugal	372	71%	187%	39%	48%
Romania	911	20%	82%	10%	19%
Scotland	182	9%	248%	4%	58%
Serbia	265	13%	72%	5%	14%
Slovakia	210	17%	153%	8%	32%
Slovenia	117	37%	133%	11%	42%
Spain	1,118	113%	172%	57%	66%
Sweden	194	38%	394%	19%	137%
Switzerland	284	36%	348%	19%	83%
Ukraine	3,578	28%	196%	12%	54%
Wales	128	131%	532%	67%	232%

EUROPE

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Albania	20%
Andorra	11%
Austria	23%
Belarus	9%
Belgium	38%
Bosnia and Herzegovina	14%
Bulgaria	21%
Croatia	59%
Czechia	20%
Denmark	23%
England	54%
Estonia	28%
Finland	34%
France	25%
Germany	16%
Greece	83%
Greenland	62%
Hungary	15%
Iceland	54%
Ireland	8%
Italy	38%
Kosovo	26%
Latvia	12%
Lithuania	15%
Luxembourg	7%
Malta	12%
Moldova	19%
Montenegro	15%
Netherlands	11%
North Macedonia	13%
Northern Ireland	15%
Norway	5%
Poland	18%
Portugal	17%
Romania	10%
Scotland	10%
Serbia	12%
Slovakia	14%
Slovenia	53%
Spain	43%
Sweden	12%
Switzerland	13%
Ukraine	21%
Wales	26%

EUROPE

Driving hazards

The table below identifies the main hazards driving damage risk in Europe – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Albania	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Andorra	• Riverine Flooding • Extreme Wind • Coastal Inundation	• Riverine Flooding • Extreme Wind • Coastal Inundation	• Riverine Flooding • Extreme Wind • Coastal Inundation
Austria	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Belarus	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind
Belgium	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Bosnia and Herzegovina	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Forest Fire
Bulgaria	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind
Croatia	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Czechia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Denmark	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind

EUROPE

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
England	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Estonia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Finland	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
France	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Germany	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Greece	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Extreme Wind
Greenland	• Coastal Inundation • Extreme Wind • Cyclone Wind	• Coastal Inundation • Extreme Wind • Cyclone Wind	• Coastal Inundation • Extreme Wind • Cyclone Wind
Hungary	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Iceland	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Ireland	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Italy	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Extreme Wind
Kosovo	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding

EUROPE

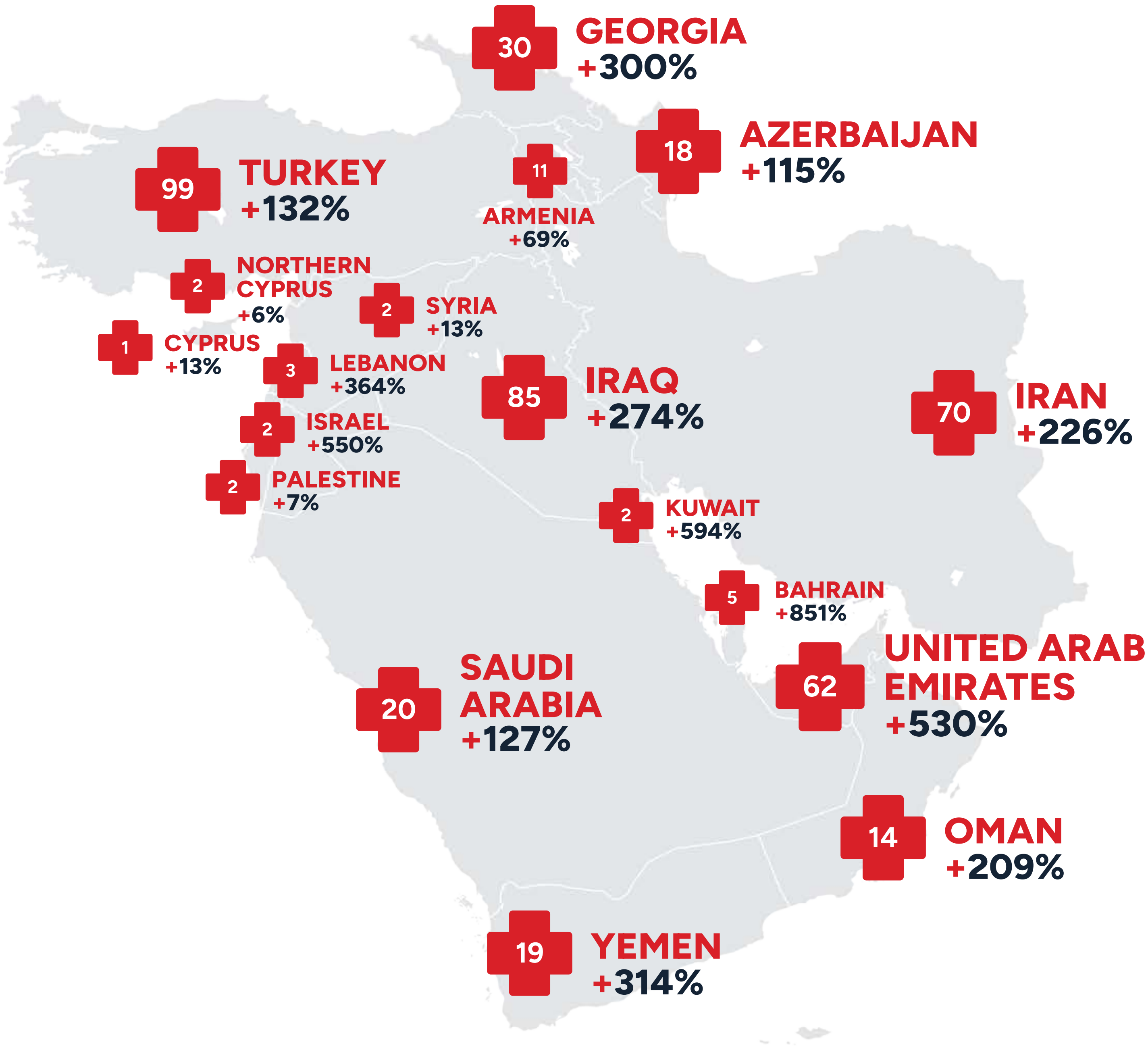
Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Latvia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Lithuania	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Luxembourg	• Riverine Flooding • Extreme Wind • Coastal Inundation	• Riverine Flooding • Extreme Wind • Coastal Inundation	• Riverine Flooding • Extreme Wind • Coastal Inundation
Malta	• Surface Water Flooding • Extreme Wind • Coastal Inundation	• Surface Water Flooding • Extreme Wind • Coastal Inundation	• Surface Water Flooding • Extreme Wind • Coastal Inundation
Moldova	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Montenegro	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Extreme Wind • Riverine Flooding • Surface Water Flooding
Netherlands	• Surface Water Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Extreme Wind
North Macedonia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Northern Ireland	• Extreme Wind • Surface Water Flooding • Coastal Inundation	• Extreme Wind • Surface Water Flooding • Coastal Inundation	• Extreme Wind • Surface Water Flooding • Coastal Inundation
Norway	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind
Poland	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Coastal Inundation	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Portugal	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind

EUROPE

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Romania	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Scotland	• Extreme Wind • Surface Water Flooding • Riverine Flooding	• Extreme Wind • Surface Water Flooding • Riverine Flooding	• Extreme Wind • Surface Water Flooding • Riverine Flooding
Serbia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Slovakia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Slovenia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind
Spain	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Extreme Wind
Sweden	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Switzerland	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Extreme Wind • Surface Water Flooding • Riverine Flooding
Ukraine	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Coastal Inundation
Wales	• Coastal Inundation • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Riverine Flooding

WEST ASIA AND MIDDLE EAST

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



10,289

hospitals analysed

*data for all countries is not shown on this map.

View the tables below for more information.

WEST ASIA AND MIDDLE EAST

Findings at a glance: RCP 8.5

- Analysis suggests that global warming has already resulted in a 58% increase in damage risk to hospital infrastructure in the region.
- Without a rapid reduction in fossil fuel emissions, the risk of damage to hospital infrastructure across the region is modelled to increase by 264% by 2100. Under a low emissions scenario this damage risk increase is reduced to 113%, resulting - overall - in half the increase in damage risk.
- Regionally, coastal inundation and flooding are the driving hazards.
- Compared to other regions, West Asia and the Middle East has a low percentage of high risk hospitals by 2100 (4.34%) - the lowest in the world after Russia and Central Asia.
- However, without a rapid phase out of fossil fuels, by 2100 up to 447 hospitals will be at high risk of partial or total shutdown from climate change extreme weather events.
- Within the region, modelling suggests the United Arab Emirates (UAE) is most impacted. The analysis indicates the UAE has already experienced a 239% increase in damage risk since 1990 due to global warming, making it one if the top 10 most impacted countries (1990-2020) in the world.
  - Coastal inundation is the most significant hazard, followed by flooding (surface water and riverine).
  - Note: UAE already has some building codes that account for an increase in severe storms, rising sea levels and flooding, so many hospitals may already be adapted. UAE also has the finances to adapt those that aren't already - so these factors should be considered when comparing UAE to other countries.
- Modelling suggests that hospital infrastructure in Bahrain, Oman and Kuwait has already experienced increases in risk of damage of 130% or more since 1990.

WEST ASIA AND MIDDLE EAST

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Armenia	245	11	4.5%
Azerbaijan	788	18	2.3%
Bahrain	47	5	10.6%
Cyprus	62	1	1.6%
Georgia	395	30	7.6%
Iran	2,086	70	3.4%
Iraq	1,766	85	4.8%
Israel	110	2	1.8%
Jordan	165	-	0.0%
Kuwait	66	2	3.0%
Lebanon	204	3	1.5%
Northern Cyprus	37	2	5.4%
Oman	184	14	7.6%
Palestine	332	2	0.6%
Qatar	75	-	0.0%
Saudi Arabia	651	20	3.1%
Syria	482	2	0.4%
Turkey	1,773	99	5.6%
United Arab Emirates	325	62	19.1%
Yemen	494	19	3.8%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Armenia	10%
Azerbaijan	29%
Bahrain	130%
Cyprus	23%
Georgia	23%
Iran	43%
Iraq	34%
Israel	66%
Jordan	3%
Kuwait	132%
Lebanon	22%
Northern Cyprus	27%
Oman	134%
Palestine	20%
Qatar	15%
Saudi Arabia	110%
Syria	9%
Turkey	27%
United Arab Emirates	239%
Yemen	75%

WEST ASIA AND MIDDLE EAST

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Armenia	245	9%	69%	2%	12%
Azerbaijan	788	28%	115%	10%	24%
Bahrain	47	239%	851%	126%	439%
Cyprus	62	8%	13%	1%	1%
Georgia	395	29%	300%	12%	100%
Iran	2,086	85%	226%	41%	76%
Iraq	1,766	104%	274%	53%	105%
Israel	110	340%	550%	185%	286%
Jordan	165	5%	5%	3%	3%
Kuwait	66	265%	594%	142%	319%
Lebanon	204	33%	364%	15%	175%
Northern Cyprus	37	4%	6%	0%	0%
Oman	184	96%	209%	44%	96%
Palestine	332	7%	7%	2%	2%
Qatar	75	12%	21%	4%	5%
Saudi Arabia	651	25%	127%	12%	57%
Syria	482	6%	13%	2%	3%
Turkey	1,773	43%	132%	20%	39%
United Arab Emirates	325	331%	530%	184%	290%
Yemen	494	96%	314%	54%	152%

WEST ASIA AND MIDDLE EAST

Driving hazards

The table below identifies the main hazards driving damage risk in West Asia and Middle East – RCP 8.5.

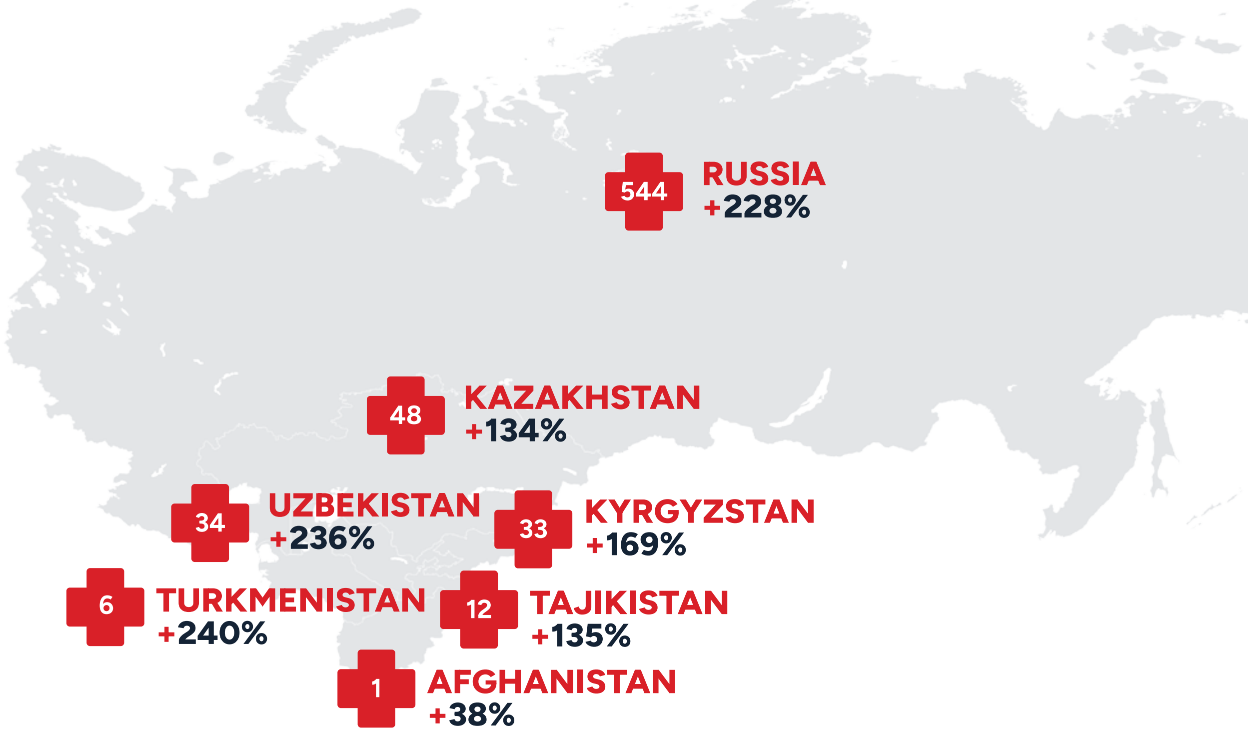
Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Armenia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Azerbaijan	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Extreme Wind • Forest Fire	• Riverine Flooding • Forest Fire • Extreme Wind
Bahrain	• Coastal Inundation • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Extreme Wind	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Cyprus	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Georgia	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind
Iran	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Iraq	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Israel	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Jordan	• Extreme Wind • Riverine Flooding • Surface Water Flooding	• Extreme Wind • Riverine Flooding • Surface Water Flooding	• Extreme Wind • Riverine Flooding • Surface Water Flooding
Kuwait	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind

WEST ASIA AND MIDDLE EAST

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Lebanon	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind
Northern Cyprus	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Oman	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Palestine	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Qatar	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Saudi Arabia	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Extreme Wind
Syria	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Turkey	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Riverine Flooding • Coastal Inundation • Extreme Wind
United Arab Emirates	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding	• Coastal Inundation • Surface Water Flooding • Riverine Flooding
Yemen	• Riverine Flooding • Coastal Inundation • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind	• Coastal Inundation • Riverine Flooding • Extreme Wind

RUSSIA AND CENTRAL ASIA

Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



16,779

hospitals analysed

Findings at a glance: RCP 8.5

- Without a rapid reduction in fossil fuel emissions, by 2100, 678 (4.04%) hospitals in the region will be at high risk of total or partial shutdown from extreme weather events.
- Analysis suggests the region has already experienced a 28% increase in risk of damage to hospital infrastructure since 1990 due to global warming.
- Without a rapid reduction in fossil fuel emissions, the region will experience a three-fold (213%) increase in the risk of damage to hospital infrastructure by 2100. In a low emissions scenario, this damage risk is reduced to 62%.
- Russia has the largest number of high risk hospitals in the region: By 2100, up to 554 (4%) Russian hospitals will be at high risk of total or partial shutdown from extreme weather events. The country is also set to experience a 228% (three-fold) increase in risk of damage to hospital infrastructure by 2100. Under a low emissions scenario this increase in damage risk is reduced to 70%.
- Without a rapid phase out of fossil fuels, Uzbekistan and Turkmenistan face the greatest increase in damage risk to hospital infrastructure by 2100 (236% and 240%), reduced to 53% and 49% under a low emissions scenario.
- Coastal inundation, riverine flooding and surface water flooding are the driving hazards for the region, with coastal inundation increasing over time.

RUSSIA AND CENTRAL ASIA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Afghanistan	164	1	0.6%
Kazakhstan	1,132	48	4.2%
Kyrgyzstan	427	33	7.7%
Russia	13,596	544	4.0%
Tajikistan	253	12	4.7%
Turkmenistan	115	6	5.2%
Uzbekistan	1,067	34	3.2%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Afghanistan	2%
Kazakhstan	26%
Kyrgyzstan	41%
Russia	27%
Tajikistan	16%
Turkmenistan	27%
Uzbekistan	51%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Afghanistan	164	3%	38%	2%	9%
Kazakhstan	1,132	35%	134%	16%	30%
Kyrgyzstan	427	54%	169%	24%	38%
Russia	13,596	54%	228%	26%	70%
Tajikistan	253	29%	135%	14%	29%
Turkmenistan	115	26%	240%	11%	49%
Uzbekistan	1,067	54%	236%	22%	53%

RUSSIA AND CENTRAL ASIA

Driving hazards

The table below identifies the main hazards driving damage risk in Russia and Central Asia – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2100
Afghanistan	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Kazakhstan	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Forest Fire
Kyrgyzstan	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind
Russia	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Riverine Flooding • Coastal Inundation • Surface Water Flooding
Tajikistan	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Turkmenistan	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Uzbekistan	• Riverine Flooding • Extreme Wind • Surface Water Flooding	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind

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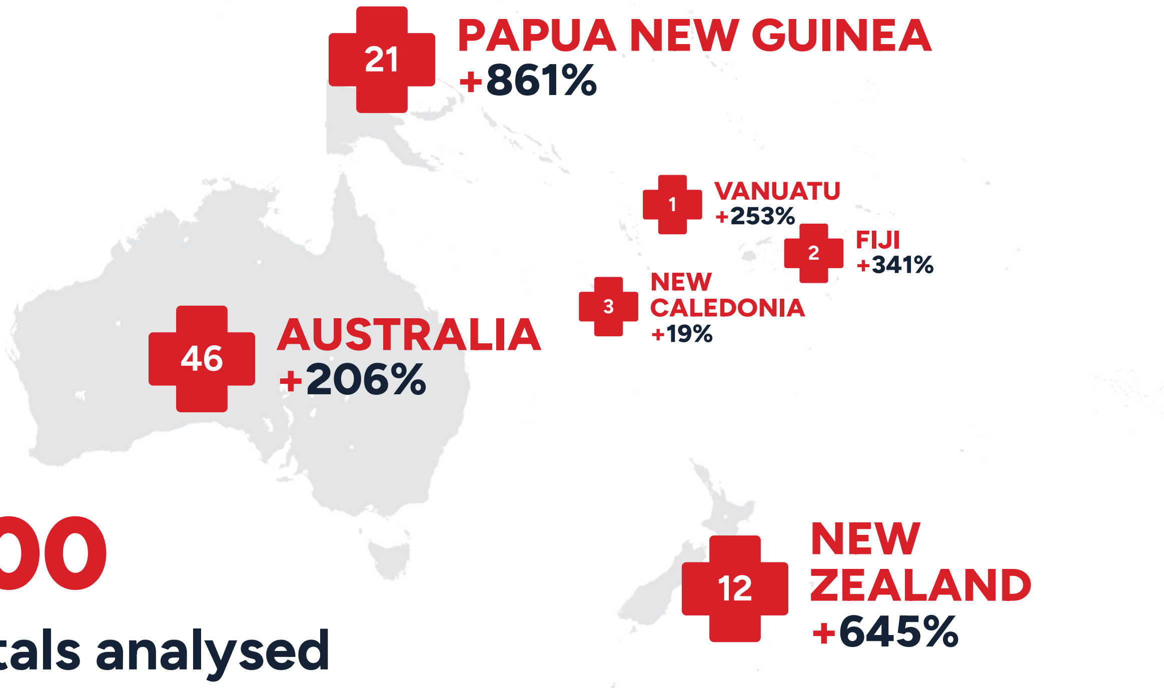
Number of high risk hospitals and percentage increase in risk of damage to hospital infrastructure 2020-2100 at RCP 8.5.



1,600

hospitals analysed

*data for all countries is not shown on this map.

View the tables below for more information.

Findings at a glance: RCP 8.5

- 1600 assets analysed in the region, with the largest number of hospitals in Australia (1,084) and New Zealand (234) followed by Papua New Guinea (95).
- Without a rapid reduction in fossil fuel emissions, by 2100 up to 92 (5.75%) hospitals in Oceania will be at high risk of total or partial shutdown due to extreme weather events.
- Without a rapid reduction in fossil fuel emissions, Oceania will experience a more than four-fold (358%) increase in risk of damage to hospital infrastructure by 2100. This is reduced to 141% in a low emissions scenario.
- Forest fire is a driving hazard in Australia in all years, along with riverine flooding and coastal inundation. Coastal inundation and flooding are also the driving hazards for the region.
- Without a rapid reduction in fossil fuel emissions, Papua New Guinea is set to experience the greatest escalation in risk of damage to hospital infrastructure in the region by 2100 - a nine-fold increase (861%). This damage risk increase is reduced to 235% in a low emissions scenario - one of the most significant decreases in risk in the world.
- Analysis suggests Papua New Guinea has already experienced the greatest increase in damage risk in the region (70%).
- Without a rapid reduction in fossil fuel emissions, by 2100 Australia could have up to 46 hospitals at high risk of partial or total shutdown from extreme weather events.
- Analysis suggests global warming has already led to New Zealand experiencing a 60% increase in damage risk since 1990. This damage risk is set to increase seven-fold (645%) unless fossil fuel emissions are rapidly reduced. Coastal inundation becomes the driving hazard from 2050, followed by riverine and surface water flooding.

OCEANIA

High risk hospitals: RCP 8.5

The table below shows the **number** of high risk hospitals and (ii) the **percentage** of high risk hospitals by 2100. High risk hospitals face unacceptable risk of partial or total shutdown.

Country	# Hospitals analysed	# High risk hospitals by 2100 RCP 8.5	% High risk hospitals by 2100 RCP 8.5
Australia	1,084	46	4.2%
Fiji	38	2	5.3%
French Polynesia	15	-	0.0%
New Caledonia	39	3	7.7%
New Zealand	234	12	5.1%
Papua New Guinea	95	21	22.1%
Vanuatu	29	1	3.4%

Increase in damage risk 1990-2020

The table below shows the percentage increase in modelled risk of damage to hospital infrastructure already expected to have occurred between 1990 (baseline year) and 2020 due to global warming.

Country	% damage risk increase 1990-2020
Australia	17%
Fiji	3%
French Polynesia	1%
New Caledonia	33%
New Zealand	60%
Papua New Guinea	70%
Vanuatu	25%

Impact of different emission scenarios

The table below shows the increase in risk of damage to hospital infrastructure from 2020 to 2100 under two different emission scenarios – RCP 8.5 (high) and RCP 2.6 (low).

		RCP 8.5	RCP 8.5	RCP 2.6	RCP 2.6
Country	# Hospitals analysed	% damage risk increase 2020-2050	% damage risk increase 2020-2100	% damage risk increase 2020-2050	% damage risk increase 2020-2100
Australia	1,084	26%	206%	12%	89%
Fiji	38	30%	341%	17%	87%
French Polynesia	15	0%	10%	0%	3%
New Caledonia	39	16%	19%	3%	3%
New Zealand	234	120%	645%	61%	279%
Papua New Guinea	95	118%	861%	61%	235%
Vanuatu	29	58%	253%	28%	52%

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Driving hazards

The table below identifies the main hazards driving damage risk in Oceania – RCP 8.5.

Country	Driving hazard 2020	Driving hazard 2050	Driving hazard 2050
Australia	• Forest Fire • Riverine Flooding • Extreme Wind	• Forest Fire • Riverine Flooding • Extreme Wind	• Coastal Inundation • Forest Fire • Riverine Flooding
Fiji	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Cyclone Wind
French Polynesia	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Cyclone Wind	• Riverine Flooding • Extreme Wind • Coastal Inundation
New Caledonia	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind	• Surface Water Flooding • Riverine Flooding • Extreme Wind
New Zealand	• Riverine Flooding • Coastal Inundation • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding	• Coastal Inundation • Riverine Flooding • Surface Water Flooding
Papua New Guinea	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Extreme Wind • Surface Water Flooding
Vanuatu	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Extreme Wind	• Riverine Flooding • Surface Water Flooding • Cyclone Wind

Further Information

Methods Background

XDI analysis is powered by the Climate Risk Engines, one of the most flexible, powerful and trusted sources of physical climate risk data in the world.

The Climate Risk Engines use engineering-based methods to assess exposure and vulnerability of asset archetypes to understand the likely damage and failure probability of assets caused by extreme weather and climate change hazards.

Results are expressed in a range of engineering or financial metrics to inform decision making at all scales.

XDI aims to ensure that the full extreme weather and climate change risk space has been properly explored. Practically this means selecting high emission pathways and testing hazards using the individual regional models which most exacerbate each hazard.

Read XDI's public Methodology Document for an overview of our approach to physical climate risk analysis, specifically the structural analysis methodology.

Access to the 2023 XDI Global Hospital Infrastructure Datasets

The 2023 XDI Global Hospital Infrastructure Physical Climate Risk Report provides a summary of findings from the 2023 XDI Global Hospital Infrastructure Datasets. If you would like to review the datasets in full, please email media@xdi.systems.

Third Party use of this data

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