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Briefing note:

Predicting disaster risk perception and preparedness around the world

To develop effective weather warning communication, agencies involved in risk management and emergency response need an understanding of the factors that drive risk perception and preparedness amongst public audiences.

While a large body of research on weather risk communication exists, most studies focus on a single country at a single point in time. This can make it difficult to know whether factors such as an individual's disaster experience, education and gender influence their risk perception and preparedness in the same way across all countries, or whether the effect of these factors depends on culture and context.

By combining data on risk perception and preparedness gathered from over 120 countries in the Lloyds Register Foundation World Risk Poll 2019, 2021 and 2023, with country-level data on income (Gross Domestic Product (GDP) per capita), disasters (Emergency Events Database (EM-DAT)), governance (World Governance Indicators (WGI)) and climate projections (Notre Dame Global Adaption Initiative (ND GAIN)),

Key points:

- Across countries, the number of weather-related disasters experienced by a country predicts greater reported risk preparedness, however, the effects of individual experience of severe weather on perceived preparedness varies between countries.
- After accounting for other factors, residents in countries projected to experience increases in flooding are more likely to report greater concern about severe weather and climate change, but also feel that they are more prepared for disasters.
- Six distinct clusters of countries have been identified based on their similarities in terms of preparedness, governance and income, and weather concern.
- This enables us to identify characteristics that should be targeted, or taken into account, in early warning messaging for public audiences. For example, identifying feasible individual risk-reduction actions when concern is high but preparedness is low.

we were able to identify: 1) country characteristics associated with weather risk perception and preparedness; 2) whether the relationship between individual characteristics and weather risk perception and preparedness were broadly generalisable or country specific; and 3) groupings of countries with shared characteristics related to risk preparedness, perception and governance.

What predicts risk perception and preparedness?

By applying a multi-level modelling approach that allowed us to separate country-level and individual-level predictors of risk perception and preparedness, we were able to identify: 1) individual characteristics that consistently predicted risk perception or preparedness across countries; 2) country-level characteristics that predicted risk perception and preparedness; and 3) cases where the effect of a specific factor differed between countries. The findings summarised below were stable across the 2019, 2021 and 2023 rounds of the World Risk Poll.

- **National disaster experience:** Residents in countries that had experienced a higher number of weather and climate-related disasters were more likely to perceive their households to be well prepared for disasters. However, there was no link between observed disasters and perceiving climate change as a threat to the country.

- **Individual experience of severe weather:** While country-level experience of disasters was associated with greater overall perceived risk preparedness, the relationship between personal experience of severe weather and perceived risk preparedness differed between countries (see Figure 1).

- **Gender and education:** Irrespective of country, women were found to report higher weather risk perception and lower overall perceived disaster risk preparedness than men.. Education was consistently linked to higher perceived climate change risk across countries.

- **GDP:** Lower GDP per capita was associated with higher worry about severe weather events causing harm but not with any other measure of risk perception or preparedness.

- **Future climate:** Residents in countries projected to experience increases in flood hazards due to climate change were more likely to perceive climate change as a threat to their country and worry about weather-related disasters. However, they were also more likely to perceive their household, local government and national government to be well prepared for disasters. Projected changes in heatwaves and sea-level rise were not found to predict any outcomes.

Identifying groups of countries for targeting risk communications

Cluster analysis helps us to identify countries with shared characteristics. This can be useful in identifying where different warning approaches might be more (or less) effective and highlighting what elements of risk reduction could be most effectively targeted (e.g. raising awareness, improving capacity to take action, identification of actions to take).

To perform the analysis, variables summarising risk perception and preparedness for age cohorts, gender, and income groups were produced for each country and combined with national data on disasters, governance, weather and climate projections. Six robust clusters were identified, characterised by differences in: 1) preparedness, 2) affluence and 3) weather concern.

Figure 1: Plots illustrating the different relationships between severe weather experience and perceived risk preparedness of national government across a subset of four countries.

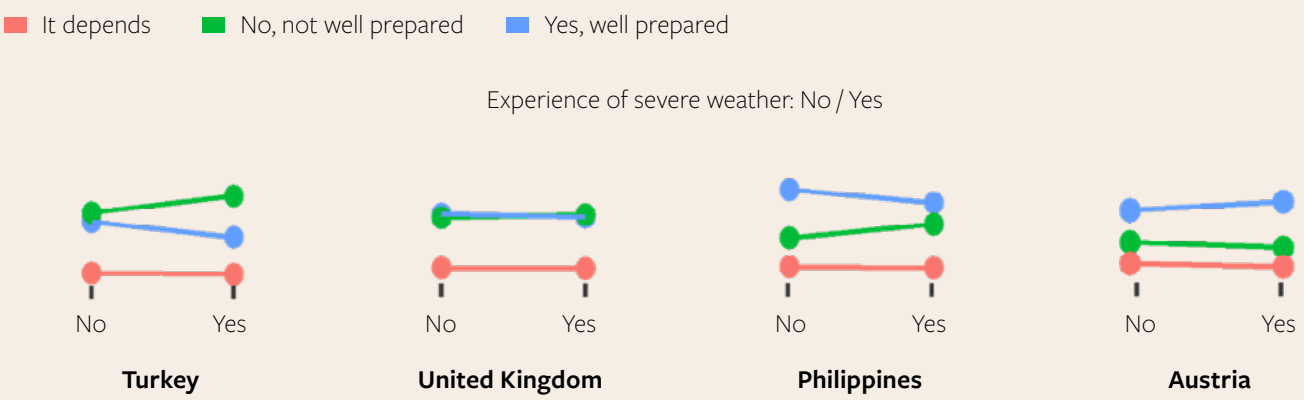
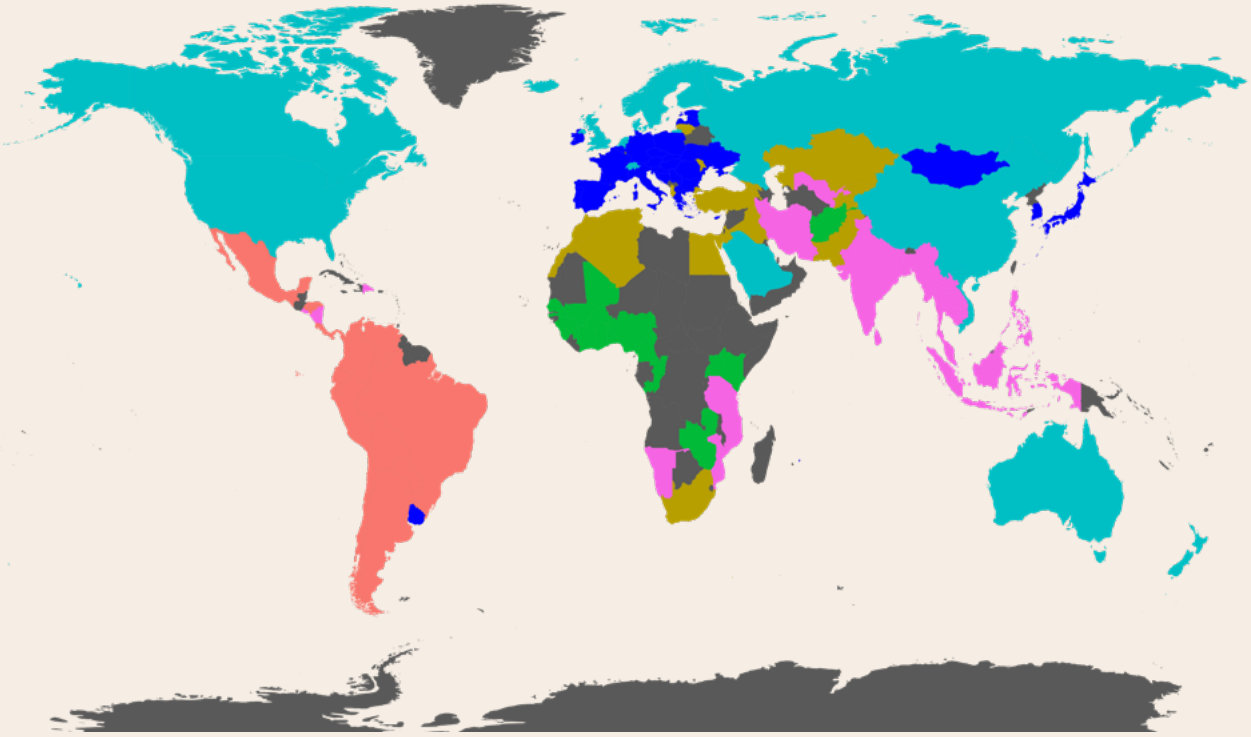


Figure 2 Map displaying countries in each of the six clusters identified.



Cluster 1 (unprepared, low-affluence, high-concern)
Is concentrated in Africa, comprising low- and lower-middle-income countries. As weather concern is high but affluence and preparedness low, long-term capacity building should be accompanied by efforts from disaster risk reduction and emergency management agencies to identify feasible actions that low-income households and communities can take to reduce risk of harm from severe weather and climate events in the immediate term. These efforts should also include identifying how such actions can be communicated to the public through trusted and accessible channels.

Cluster 2 (unprepared, low/mid-affluence, low-concern)
Is geographically spread, including countries in Africa, Eastern Europe, the Middle East and Central Asia. In addition to a need to address unpreparedness through identifying and communicating feasible risk reduction options, the lower concern highlights the need for increased awareness of weather-related risks (e.g. through media engagement by national meteorological services, and educational policy and initiatives).

Cluster 3 (unprepared, mid-affluence, high-concern)
Is concentrated in South America. Steps to address unpreparedness could include assessing barriers to preparedness at individual, local, regional and national levels. Risk communicators should convey both feasible individual-level protective actions, as well as building communication into scenario planning exercises by emergency response agencies.

Cluster 4 (somewhat-prepared, high-affluence, low-concern)
Is geographically dispersed but tends to contain high-income countries. Assessments of whether feelings of preparedness reflect actual preparedness should be undertaken to identify whether any disparities exist, with risk communications addressing points where residents may not be aware of being at risk or actions to take in response to warnings.

Cluster 5 (unprepared, high-affluence, high-concern)
Primarily contains high-income countries. The cluster is largely concentrated in European countries, but also includes Japan, Mongolia and Uruguay. Scenario planning exercises that integrate communication strategies should be undertaken alongside systematic post-event reviews to assess where gaps in warning communication might be, as well as signposting 'what to do' in the event of a warning.

Cluster 6 (somewhat-prepared, low/mid-affluence, mixed-concern)
Is mainly concentrated in South-East Asia and East Africa containing several countries that are implementing impact-based forecast and warning services, potentially resulting in stronger feelings of preparedness. Agencies involved in emergency management can reinforce and develop preparedness through continued engagement with educational institutions and media to ensure awareness of warnings and what actions to take.

Data deficient

Next steps

Our findings underline the importance of understanding local context when working within countries to increase risk preparedness and resilience.

Through taking into account current perceived preparedness, concern about weather and affluence communications may be better targeted to their intended audiences.

Going forward this project will:

Develop and test risk communication strategies in a set of indicative focal countries reflecting a range of the clusters identified.

Explore which types of message framing are likely to be best understood and acted on.

Examine whether perceived preparedness reflects other indicators of preparedness.

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Find out more

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If you have found this briefing note useful or would like further information about this project or our broader work on weather warning communication please contact Dr Andrea Taylor.

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Visit the **website** for further information.

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