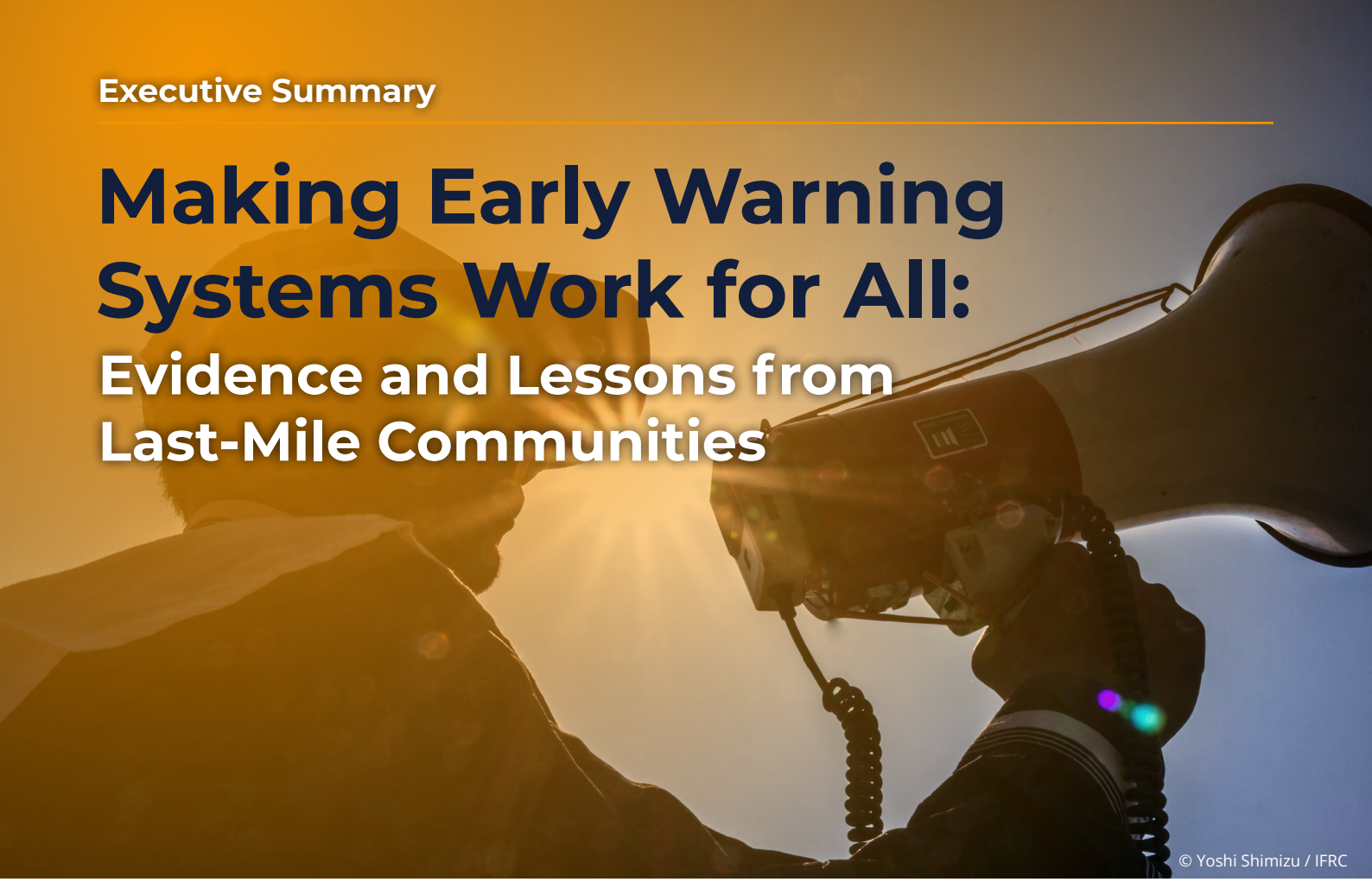
Executive Summary

Making Early Warning Systems Work for All:

Evidence and Lessons from Last-Mile Communities



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Key Messages

1. **Inclusivity determines effectiveness.** Effective early warning systems (EWS) are built with communities, not delivered to them. Meaningful inclusive engagement in EWS development is the strongest predictor of whether warnings will be trusted, understood, and acted upon.
2. **Trust determines action.** People act on warnings from sources they trust, built through consistent accuracy, genuine partnership, and sustained engagement.
3. **Context dictates design.** Message format, language, channels, protective actions, and needed resources vary dramatically by context and can only be determined through engagement with the at-risk communities.
4. **No single communication channel reaches everyone.** Redundant, diverse dissemination strategies, combining modern technology with traditional networks and trusted messengers, are essential.
5. **Effective EWS require adequate resourcing.** Building and sustaining inclusive EWS requires dedicated funding and resources — not just for technical infrastructure and operations, but for ongoing community engagement and for providing support that enables people to act on warnings they receive.

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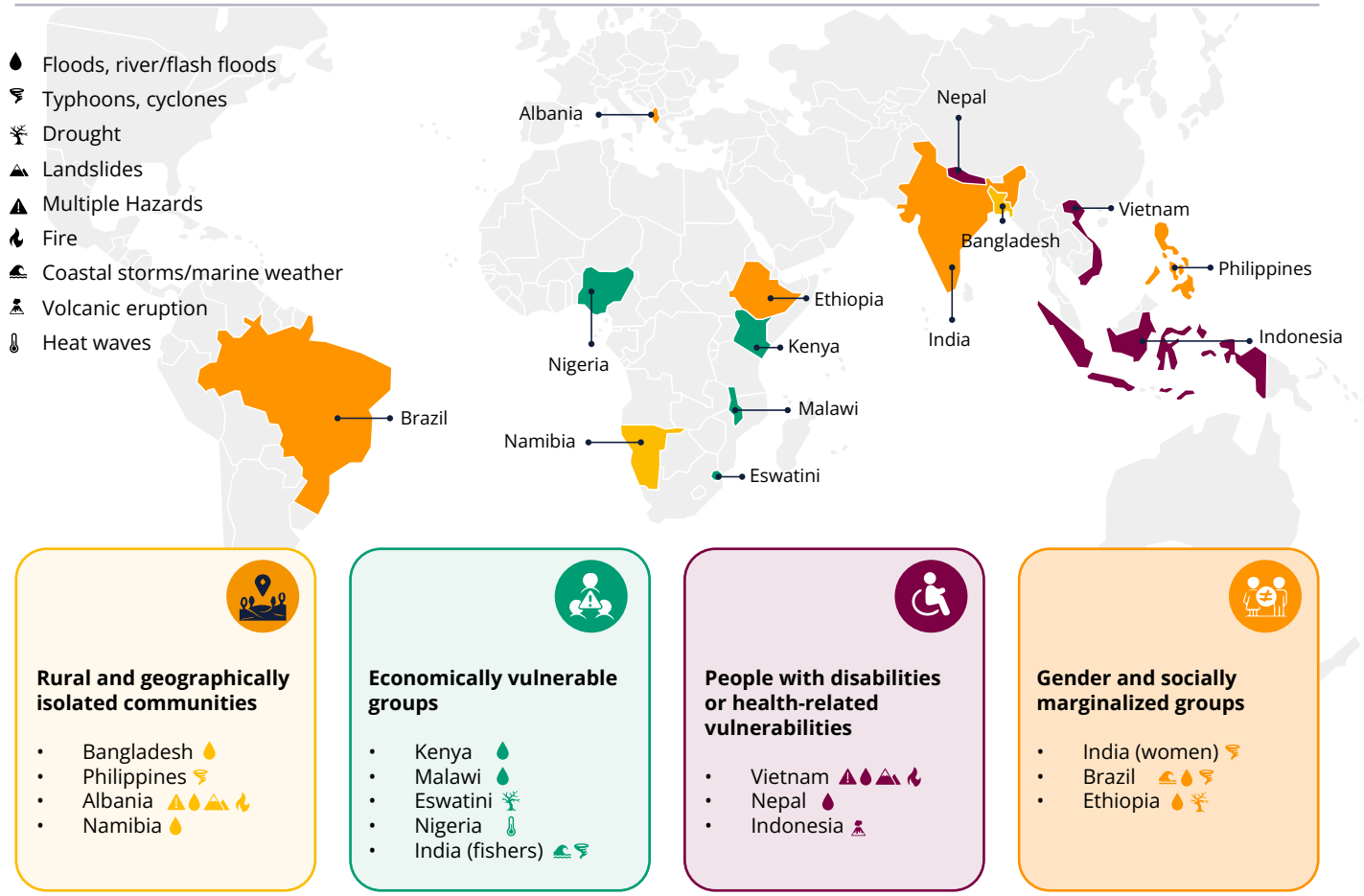
Overview

Early Warning Systems (EWS) are among the most effective tools for reducing disaster risk and saving lives, yet their effectiveness ultimately depends on whether warnings translate into protective action. To maximize impact, early warnings must be inclusive and address specific vulnerabilities and needs of the people they aim to protect, especially marginalized groups who often face the greatest risks with the least access to information and services.

To understand what enables warnings to drive action at the community level, the IFRC Global Disaster Preparedness Center (GDPC) supported 15 studies across 14 countries focusing on last-mile communities — **groups that are often geographically isolated, socially marginalized, or otherwise hard to reach**. Spanning a wide range of contexts, these studies examined the barriers and enabling factors that influence whether warnings are received, understood, and acted upon.

Drawing on these studies and complementary literature, this report identifies the **features that best support inclusive, accessible, and actionable early warning** for last-mile communities. By consolidating insights across diverse geographies and population groups, it provides an evidence base to inform policy, programming, and advocacy aimed at strengthening people-centered EWS.

The **report pinpoints critical yet under-addressed system components** — elements essential to ensuring warnings reach and protect everyone but which often receive limited attention or investment. For those working to advance inclusive early warning and early action (EWEA), this report serves as both a diagnostic and a guide, **revealing where systems often falter and what can be done to make them more inclusive**, trusted, and effective.



Study locations and last-mile community types covered in this research

Findings: Barriers and Enablers across the Four EWS Pillars

Across the studies, breakdowns in EWS often occurred **not because warnings did not exist, but because they did not translate into clear, trusted, and actionable guidance** for diverse last-mile groups. These gaps, in turn, often stem from limited engagement of last-mile populations they intend to serve. The findings therefore reinforce that **engagement across all four pillars of EWS design and development is critical** to ensure that warning messages are delivered at the right time, in clear, appropriate language, and through trusted channels, so that people not only receive them but are also willing and able to act.

Disaster risk knowledge (Pillar 1): Risk knowledge is shaped by lived experience, cultural and Indigenous knowledge, and it directly affects willingness to act. At the same time, people recognize that patterns are shifting with climate change. When groups are not engaged in activities that help to share, build, or strengthen risk knowledge, they may underestimate risks or lack critical information.

Hazard monitoring and forecasting (Pillar 2): Forecast quality is improving, but usability for end users lags. Products are rarely localized to places and livelihoods, and formats are too technical for quick decisions. Communities have their own ways of understanding and predicting weather and environmental changes. Blending scientific outputs with community-defined indicators and plain, impact-focused phrasing makes forecasts more relevant and trusted.

Warning dissemination and communication (Pillar 3): Messages frequently arrive late, through fragile channels, or in formats people cannot access or understand. Over-generic alerts and jargon reduce comprehension. Multi-channel, multilingual, and redundant delivery, paired with simple, specific actions, consistently reaches more people and reduces confusion.

Preparedness to respond to warnings (Pillar 4): Warnings only lead to action when people have time, clear instructions, and the means to act. To respond to warnings, people must know what to do, believe action will make a difference, and have the time and financial and non-financial resources to follow through.

Inclusive planning at household, community, and government levels ensures preparedness measures are realistic for different groups and that people have sufficient time, resources, and confidence to take protective action. Pre-agreed actions, basic resources (e.g., transport, cash, assistive support), and practiced roles for local groups help translate warnings into action.

Recommendations for More Effective EWS

The recommendations build directly on the findings from the GDPC-supported studies and additional literature. Directed at practitioners, policymakers, and donors, these recommendations seek to help actors address and **overcome the barriers identified across all four pillars**, with particular attention to community engagement, trust, and the ability to act.

Inclusivity: Building systems with communities so they reflect the real needs, priorities, and capacities of all members.

- **Center marginalized communities as co-designers and co-owners through meaningful participation in design, implementation, and evaluation**. Centralized formal systems often fail to meet local needs because they do not reflect community realities, needs and priorities. Establish community committees with diverse representations, use participatory design and assessment methodologies, disaggregating "community" in engagement processes.
- **Integrate Indigenous and traditional knowledge with scientific forecasting through structured collaboration**. Indigenous knowledge provides hyperlocal specificity and cultural legitimacy that scientific forecasts alone cannot achieve. Establish co-management protocols where meteorological services formally recognize Indigenous forecasters as partners, and train youth as "knowledge bridges" between traditional and scientific systems.
- **Build systematic feedback mechanisms**. Establish post-event review processes that gather community input on warning effectiveness. Create two-way communication mechanisms for communities to flag gaps in real-time and use this feedback to iteratively improve systems.
- **Strengthen policy and financing frameworks that institutionalize inclusion.** Inclusion becomes sustainable when governments, donors, and policymakers hard-wire it into the mandates, incentives, and funding structures. EWS policies and frameworks should define minimum standards for participation and representation, clarify institutional roles, and prioritize funding for sustained community engagement rather than one-off consultations.

Accessibility: Removing barriers so all people can receive, understand, and benefit from warnings.

- **Implement multi-channel, redundant dissemination strategies combining modern technology with traditional networks and trusted intermediaries**. Word-of-mouth through community leaders was the most common way last-mile populations received warnings, yet formal systems rarely leverage these networks systematically. Map existing social networks, layer technological channels with human and physical channels, and conduct communication drills to test effectiveness.
- **Design clear messages in local languages and accessible formats with consistent branding**. Language barriers, technical jargon, and text-only formats consistently prevented comprehension. Develop warning templates using plain language, create visual communication products including pictographic warnings and sign language interpretation, and establish nationally consistent EWS brand identity to distinguish official warnings from misinformation.
- **Invest in last-mile infrastructure with backup power systems and community radio stations.** Infrastructure deficits physically prevent warnings from reaching remote communities regardless of message quality. Strengthen community radio powered by solar panels and provide communication equipment to volunteer networks with maintenance protocols.

Actionability: Designing warnings and supporting mechanisms that lead to protective action.

- **Include specific, context-appropriate protective action guidance, not just hazard descriptions.** Even when people receive warnings, they often do not know what to do. Co-design hazard-specific action guides that outline progressive steps linked to warning levels and tailor guidance to specific vulnerable groups.
- **Invest in public education and awareness** through community drills, school-based programs, and communication campaigns that strengthen practical preparedness skills and foster a sustained culture of risk reduction.
- **Build and maintain community trust through consistency and accountability.** Trust is foundational to EWS effectiveness yet easily eroded by false alarms, unfulfilled promises, or warnings perceived as irrelevant. Ensure accuracy in forecasting, follow through on commitments made during engagement, acknowledge when systems fail, and demonstrate how community feedback leads to tangible improvements.
- **Link warnings to anticipatory action programs providing financial and material resources**. Poverty forces people to disregard warnings, continuing dangerous work rather than losing income or being unable to afford evacuation. Develop early action protocols with pre-defined triggers, include cash transfers enabling protective actions, and provide trained volunteers to assist vulnerable individuals.
- **Ensure adequate lead time by improving forecast-to-communication speed and strengthening dissemination networks**. Delayed dissemination was pervasive, with warnings arriving too late for action. Develop standard operating procedures that define information flow, stagger warning timelines for populations needing extra preparation time, and support household and community-level planning workshops.

Conclusion

The evidence that emerged from this review underscores that last-mile challenges are not purely technical but fundamentally social and institutional. **Building inclusive EWS requires reframing last-mile populations as first-mile partners**: knowledge holders, decision-makers, and actors in their own right.

Systems become more inclusive, accessible, actionable, and ultimately effective when built on three foundations: genuine trust and sustained relationships with diverse last-mile populations, their meaningful participation across all four EWS pillars, and the resources that enable protective action when warnings arrive. Aligning investments and policies with these principles is essential for achieving universal EWS coverage and ensuring that warnings translate into action.

Download the full report for detailed findings, case studies, and extended recommendations.

www.preparecenter.org

This material has been funded by UK International Development from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

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