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Enhancing inclusion in mobile-enabled risk communications:

Lessons from South Africa

June 2024

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The South African Red Cross Society (SARCS) is a member organisation of the International Federation of the Red Cross and Red Crescent Societies (IFRC), the largest volunteer-driven organisation in the world. Together with local stakeholders, SARCS plays a key role in disaster preparedness and post-disaster recovery in South Africa.

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Contents

Abbreviations and acronyms	2
Executive summary	4
1. Introduction	6
2. Methodology	7
3. Research contexts	10
4. The mobile landscape in South Africa	14
5. The EWS landscape in South Africa	15
6. Personas	18
7. Key findings	29
8. Recommendations	39
9. Conclusion	43

Acronyms and abbreviations

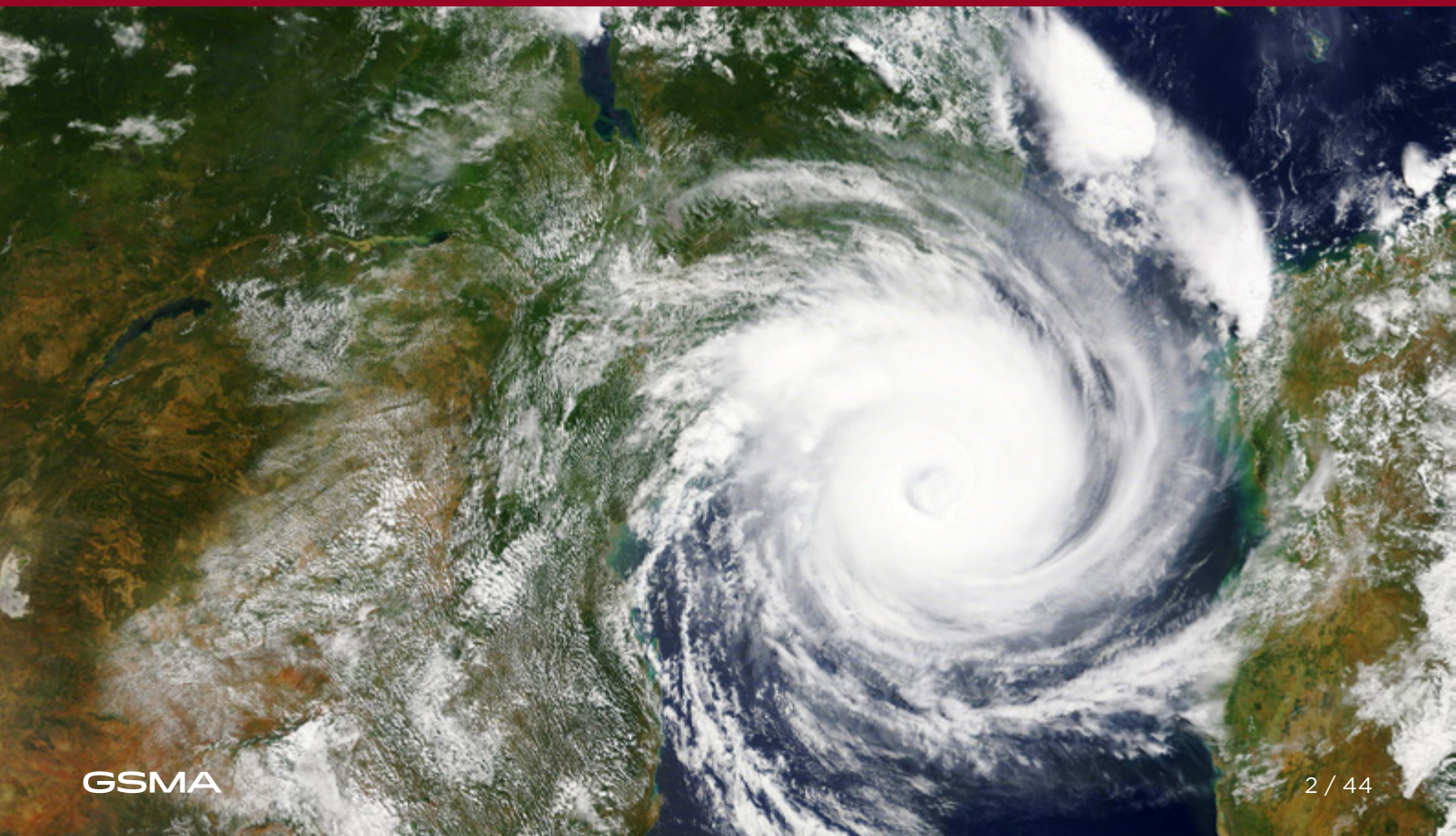
CB	Cell Broadcast
EW4All	Early Warnings for All
EWS	Early Warning System
FGD	Focus Group Discussion
HCD	Human-Centred Design
IFRC	International Federation of Red Cross and Red Crescent Societies
IDI	In-Depth Interview
KII	Key Informant Interview
KYC	Know Your Customer
MHEWS	Multi-Hazard Early Warning System
MNO	Mobile Network Operator
NDMC	National Disaster Management Centre
PDMC	Provincial Disaster Management Centre
SARCS	South African Red Cross Society
SASSA	South African Social Security Agency
SAWS	South African Weather Service
SMS	Short Message Service (text message)
SRD	Social Relief of Distress
WMO	World Meteorological Organization

Terms and definitions

Risk communication refers to the dissemination of information about potential hazards to help individuals, communities and organisations make informed decisions to mitigate risks effectively. It encompasses the methods and channels used to communicate, as well as messaging that helps receivers understand the risks and actions they need to take.

Emergency warning or early warning is a type of risk communication that alerts the public to immediate and impending threats and emergencies. These warnings are intended to trigger urgent action to protect lives and property.

Weather information includes forecasts and other meteorological data relevant to everyday life and planning. This information typically includes details about temperature, precipitation and other atmospheric conditions.



Executive summary

Early warning systems (EWS) are essential tools when disaster strikes, providing crucial alerts that help communities prepare for and respond to extreme weather events and environmental hazards. As climate change intensifies the frequency and severity of these events, the role of EWS and effective risk communication becomes even more critical. These systems offer a proactive approach to disaster risk reduction, enabling timely actions that can significantly mitigate loss of life and economic damage.

To maximise their impact, risk communications must be inclusive – accessible, comprehensible and actionable to all. This is underlined by Early Warnings for All (EW4All),[1] a United Nations initiative that aims to ensure every individual on the planet is covered by an EWS by 2027. Special attention to the inclusion of marginalised populations, which are often more vulnerable to climate risks and excluded from risk communications and emergency alerts, will be essential to this endeavour.

Given the critical nature of EWS, this research focuses on how mobile-enabled risk communications about weather hazards can be more inclusive. As mobile technology becomes increasingly ubiquitous, there are significant opportunities to disseminate life-saving information to communities on even the most basic mobile devices. However, barriers to mobile technology and the opportunities they provide persist, particularly for marginalised communities.

Using South Africa, a country frequently confronted with severe weather challenges exacerbated by climate change, as a case study, the research uses a human-centred design (HCD) approach to assess the accessibility and effectiveness of current mobile risk communication methods among marginalised populations, such as older people, migrants, residents of informal settlements, youth or those recently affected by a disaster. Co-creation workshops were also conducted to explore ways to make risk communications more inclusive.

The research revealed disparities in access to technology, largely due to financial barriers, that affect the reach of risk communications. It also found that marginalised populations, including older people, migrants and residents of informal settlements, often rely on interpersonal networks and word of mouth for information about weather hazards. Youth are more digitally connected and can serve as digital connectors within their communities, providing a gateway to timely information. The study also revealed that trust in the communication channel and information source influences the extent to which one engages with and responds to risk communications. When the same information is shared through multiple channels, this trust can be reinforced. Additionally, “weather literacy” and unique barriers, such as language for migrants and visual impairments for older people, can make it more difficult to understand risk communications. The degree to which marginalised groups take action on weather information is influenced by a combination of financial resources, location-based factors and awareness of risk.

1 World Meteorological Organization (WMO). (2024). WMO and the Early Warnings for All Initiative.

To address these challenges, this report offers recommendations for creating more inclusive and effective risk communication strategies. Key recommendations include:

- **Adopt a multi-channel approach:** While mobile phones are an effective tool for disseminating information to communities, a combination of digital and traditional channels is crucial to reach everyone in the community, especially groups without direct access to technology.
- **Leverage community networks:** Engaging trusted local leaders and organisations and tapping into existing community practices and channels can extend the reach and impact of risk communications.
- **Create accessible content:** Providing clear and concise information through a mix of voice notes, symbols and text can help ensure that messages are accessible and understandable to diverse groups of people. Communications should also be provided in local languages and dialects and the languages of foreign nationals. Consistent formatting and recognisable branding can help to reinforce messaging and build trust.
- **Target messages:** Differentiating emergency alerts from general risk information and ensuring communications are narrowly geographically targeted can help make messages more relevant and prompt timely action. Technologies like cell broadcast (CB), for example, can deliver geographically specific alerts,[2] ensuring that recipients only receive messages that are relevant to them.
- **Engage marginalised communities:** Collaborating with communities at every stage, from inception and design to implementation, can help ensure information is easily understood. Risk communications should be part of an ongoing dialogue with communities to build trust and facilitate knowledge sharing.

This report raises awareness of the need to assess and build inclusion into risk communication strategies, in any context. It calls on governments, humanitarian organisations, mobile network operators (MNOs) and local communities to collaborate on truly inclusive communication systems that give every individual the information they need to protect themselves and their assets effectively. Through such efforts, the vision of the EW4All initiative can be realised – not only by expanding the reach of emergency alerts, but also by fostering resilient communities that are well prepared to respond to disasters.

2 Parsons, O. and Hamilton, Z. (2023). Cell Broadcast for Early Warning Systems: A review of the technology and how to implement it. GSMA.

01

Introduction

In the past 20 years, natural hazards have claimed the lives of 1.23 million people and 90% of these deaths occurred in low- and middle-income countries (LMICs). These events have also led to economic losses of $2.97 trillion worldwide.[3] The increasing frequency and intensity of such disasters is attributed to the escalating climate crisis, with the World Bank predicting that climate change could drive as many as 130 million people into extreme poverty by the year 2030.[4]

3 United Nations Office for Disaster Risk Reduction (UNDRR). (2020). Human Cost of Disasters: An overview of the last 20 years - 2000–2019.

4 Jafino, B.A. (2020). Revised Estimates of the Impact of Climate Change on Extreme Poverty by 2030. Policy Research Working Paper 9417. World Bank Group.

Early warning systems (EWS) are some of the most proven and cost-effective methods for reducing disaster-related deaths and losses.[5] However, those responsible often struggle to create effective and trusted systems for communicating climate-related risk, especially to potentially marginalised groups.[6] At the United Nations Climate Change Conference (COP27) in 2022, the UN Secretary-General announced the Early Warnings for All (EW4All) initiative that has the ambition for every person on earth to be protected by an EWS by 2027. Within the Multi-Hazard Early Warning Systems (MHEWS) plan, the World Meteorological Organisation (WMO) promotes inclusion and a people-centred approach to disseminating actionable information more effectively.[7]

Today, 95% of the global population resides in areas covered by a mobile network. [8] As a result, mobile technology has increasingly become an essential tool to improve the reach and function of EWS. However, marginalised groups often experience barriers to accessing and using mobile technology that have left them disproportionately excluded from mobile-enabled risk communications, including early warnings.[9] Conversely, however, mobile channels can create opportunities for risk communications to be more inclusive, with real-time, geolocated alert capabilities and multi-directional information flows. For example, cell broadcast (CB) is a messaging system capable of rapidly delivering a single message to millions of devices within a specific geographical area leveraging both sounds and icons. It functions by broadcasting messages through designated cell sites based on the location of a subscriber's handset, providing location-specific alerts without the need for a phone number.[10] This method makes risk communications more inclusive as it leverages both sounds and images, and every handset in the area receives the information regardless of whether their contact details are registered.

Like many countries, South Africa has witnessed a rise in the number and severity of natural hazards like floods, cyclones and storms. These events have led to the loss of lives, property and livelihoods. Over the past four decades, the country has endured more than 40 flood-related disasters, claiming an average of 46 lives a year.

Vulnerability to climate risks has been exacerbated by inequalities stemming from the apartheid era,[11] such as segregation policies that forced communities to establish informal settlements in hazardous areas like floodplains or on steep slopes. Such inequalities have left these communities with limited physical and financial resources, and many homes in these areas are constructed of materials that are not resilient to extreme weather conditions.

This reports examines the inclusivity of risk communications for weather events in South Africa from the perspective of end users, assessing both the barriers and opportunities of mobile and analogue channels.

5 UNDRR. (2023). Words Into Action: A Guide to Multi-Hazard Early Warning Systems.
6 Golding, B., ed. (2022). Towards the "Perfect" Weather Warning.
7 WMO. (2024). WMO and the Early Warnings for All Initiative.
8 GSMA. (2023). The State of Mobile Internet Connectivity 2023.
9 Brown, S. et al. (2022). "Executive Summary". The Missing Voices Approach Manual. Practical Action.
10 Parsons, O. and Hamilton, Z. (2023). Cell Broadcast for Early Warning Systems: A review of the technology and how to implement it. GSMA.
11 Seekings, J. (2005). Class, Race, and Inequality in South Africa.

02

Methodology

Research objectives

The main objective of this research was to answer the question, **"How inclusive are mobile-enabled risk communications and how can they be made more inclusive?"**

In partnership with the South African Red Cross (SARCS), this research explores the use of mobile and digital technologies in risk communications and linked factors of inclusion and exclusion in South Africa. It provides recommendations for SARCS to strengthen their role in the disaster response ecosystem, and to policymakers, MNOs, humanitarian organisations and other stakeholders engaged in risk communications to become more inclusive of marginalised groups.

Given the limited number of risk communications and early warnings received by the research participants, the report also examines how people engage with weather information more broadly and leverages these insights to provide recommendations for risk communication strategies.

This research is primarily focused on top-down risk communication and dissemination of early warnings. It does not explore the use of mobile technology for feeding into EWS (i.e. the design, feedback mechanisms, citizen science approaches, and data gathering).

Research questions included:

1. What channels and communication techniques are currently used for communicating risk to communities? What is the role of mobile technology?
2. What factors impact the inclusivity and actionability of risk communications?
3. How can mobile-enabled risk communications be made more inclusive and actionable?

Research methodology

The research was conducted in two phases. The first phase consisted of a **desk review** of existing literature on inclusive risk communications, focusing especially on mobile-enabled communications for natural hazards. Thirteen **key informant interviews (KIIs)** were also conducted with risk communication experts and humanitarian practitioners, both globally and in South Africa.

The second phase consisted of in-country qualitative data collection. One-week design sprints were conducted in Durban, Musina and East London, sampling rural, peri-urban and urban areas (Table 1). All three locations have experienced a rapid-onset weather disaster within the past three years, and local SARCS offices have been part of the response. Based on the background research, and in consultation with SARCS, marginalised groups were selected in each location, with preference given to groups that are more frequently excluded from climate-related risk communication, as identified by SARCS.[12] A combination of participatory human-centred design (HCD) methods were used, beginning with **in-depth interviews (IDIs) and focus group discussions (FGDs)**, to better understand barriers to risk communications and the reality of the target personas. Then, **co-creation workshops** were held with the target users to create ideas for effective solutions and get feedback on low-fidelity prototypes.

In total, the project team engaged **132 community participants** and spoke with **three SARCS branch managers, eight SARCS volunteers** and **two community leaders.**

Table 1:

Research methodologies

Design sprint 1		Design sprint 2	Design sprint 3		
Durban (Urban)		**Musina** (Peri-urban)	**East London** (Rural)		**East London**[13] (Urban)
					
18 women (18–**F**) **Age range** 30–60	**18 youth** (8–**M**), (10–**F**) **Age range** 18–35	**36 migrants** (18–**M**), (18–**F**) **Age range** 20–70	**34 older people** (2–**M**), (32–**F**) **Age range** 60–90	**10 persons with disabilities** (4–**M**), (6–**F**) **Age range** 20–50	**16 women** (16–**F**) **Age range** 30–50

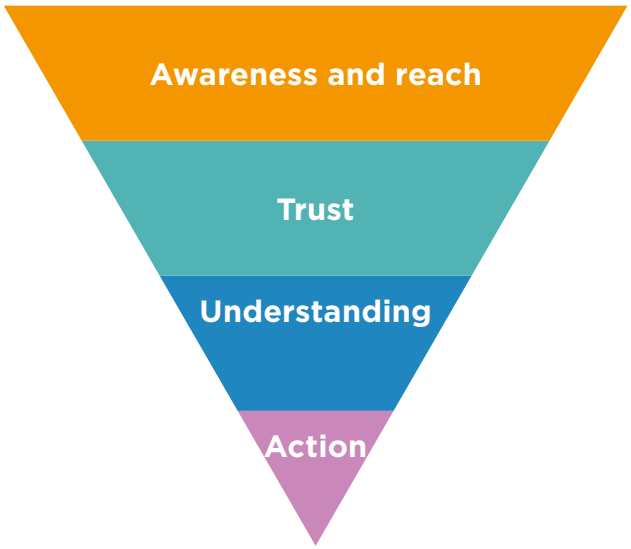
F = Female; **M** = Male

12 Brown, S. et al. (2022). "Executive Summary". The Missing Voices Approach Manual. Practical Action.

13 Although urban women were not among the target research participants for East London, the project team decided to add them as a comparison group to urban women from Durban. Ultimately, there were no significant differences to report between the two groups.

Analytical framework

The research employed a tool called the "Reach Model", both to design tools and as an analytical framework. It was introduced in related literature by the WMO[14],[15] and was well-received as a framework for risk communication in the KIIs in this research. This model outlines the essential steps in effective risk communication by dividing them into four categories: Awareness and reach, Trust, Understanding and Action. In applying this model, the research examines how different communication channels, messaging sources and content formats affect the ability of participants to receive, trust, understand and act on vital information. This approach not only helps to identify the barriers faced by marginalised communities, but also to develop tailored strategies to address specific needs.



Awareness and reach:

The ease and speed with which people are reached with important weather information.

This is largely related to the communication channel. This study explores access to channels that require personal technology, such as a mobile phone or TV, that rely on proximity to a channel such as billboards or sirens, and those that rely on relationships, such as word of mouth or community organisations.

Trust:

The degree to which people trust the source and content of the message and, therefore, believe the information, feel confident sharing it with others and take necessary action.

This is related to the messaging source and the channels they use. The research sought to understand which channels hamper trust and how channels can be made more trustworthy.

Understanding:

The degree to which people understand the content of the messages they receive.

Findings often related to the message content and format (i.e. text, voice, symbols, language). The research attempted to isolate key points of confusion in current weather and risk communication and tested options for improving understanding.

Action:

The ability of people to take preventative action to reduce the harm of risks based on the risk communication they receive.

This is dependent on the three other categories, as well as demographic and environmental factors, such as resources, location and ability. The research probed whether risk messaging inspires action, whether people are aware of the actions available to them and whether they believe they have the ability to take those actions.

14 WMO. (2022). Bulletin: Early Warning and Anticipatory Action. Vol. 71 (1).
15 WMO. (2021). WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services. Part II: Putting IBFWS into Practice.

03

Research contexts

This chapter provides snapshots of the three research locations and respective target participant groups selected for the research. In close consultation with SARCS, each location and target participants were selected to reflect the diverse socio-economic and geographical landscapes of South Africa, and to explore how different marginalised communities experience and respond to weather-related risks.

These samples are intended to illuminate the unique challenges and needs of each group and inform the development of inclusive risk communication strategies more broadly. However, it is important to recognise that this research and its findings are specific to these contexts and cannot conclusively be extended to wider settings.

Location 1
Urban areas surrounding Durban

Predominant local language:
Zulu

Overview:

Durban is the third most-populated city in South Africa (population: 3,262,128),[16] located in KwaZulu-Natal province on the east coast of the country. The Durban metro area is experiencing a population boom as people come from surrounding areas in the hope of finding work.[17] Many of these people live in densely packed informal settlements, known as townships, as a result of the government's struggle to keep up with low-cost housing demands.

Past disaster experiences:

Durban experiences heavy summer rainfalls which, coupled with poor drainage systems, often lead to flooding. In April 2022, Durban was hard hit by the slow-moving subtropical storm, Issa, experiencing flooding and landslides. Communities living below flood lines along riverbanks and on steep slopes were most affected. A total of 459 people lost their lives in the disaster.[18]

Research participants

Women

In Durban, most women included in this research are financially dependent on their male partner, who is often the primary decision-maker. Women are often in caregiver roles looking after children or elderly parents, which means they need to act on behalf of others during a disaster. Gender-based violence (GBV) against women raises safety concerns about evacuation as they are more vulnerable to harassment and abuse when outside their own homes.[19]

Digital profile: Many of the women research participants in Durban share a mobile phone with other family members, depending on their socio-economic status. They are likely to use their own SIM card on borrowed phones, which means they can be contacted intermittently. They are moderately tech-savvy and likely to use chat platforms, such as WhatsApp, and to spend time on social media.

Young adults (18–35 years)

High youth unemployment in South Africa means that young adults living in urban areas are often financially reliant on their parents.[20] They remain at home alone during the day while other family members go to work and school. Due to their age, they may not have experienced past disasters and are likely to have a lower risk perception.

Digital profile: Youth were the most tech-savvy of the research participants. They are likely to use chat platforms such as WhatsApp and to spend time on social media. Depending on their socio-economic status, they may share a mobile phone with another family member and they are often out of airtime and data.

16 World Population Review. (2024). "Durban Population 2024".
17 South African Government News Agency. (9 November 2023). "KZN population increases by 21%"; ODI. (n.d.). "City profile: Durban (eThekwini), South Africa". Mayors Dialogue on Growth and Solidarity.
18 Paul, M. (1 May 2023). "2022 Durban floods were most catastrophic natural disaster yet recorded in South African province". DownToEarth.
19 Statistics South Africa. (2020). Crimes against women in South Africa, an analysis of the phenomenon of GBV and femicide.
20 Olubusoye, O., Salisu, A.A. and Olofin, S. (2022). "Youth unemployment in Nigeria: nature, causes and solutions". Semantic Scholar. Vol. 57.

Location 2
Peri-urban Musina

Predominant local language:
Venda and a range of other local and migrant languages, especially Shona

Overview:

Musina (population: 130,899)[21] is located on the border between South Africa and Zimbabwe, near the confluence of the Limpopo and Sand Rivers. The area is known for mining and the shifting population of the town is made up mainly of migrants from Zimbabwe.

Past disaster experiences:

Musina's annual precipitation is highly concentrated in the summer months from October to April when severe late afternoon and evening thunderstorms are common.[22] These storms often cause the rivers to burst their banks. Tropical cyclones coming in from Mozambique regularly cause devastating flooding in the area. The path and severity of these storms can be difficult to predict, making risk communication more challenging.

Target research participants

Migrants

Many migrants are transient between Zimbabwe and South Africa, which means they may not be integrated into their community and may have missed out on regular risk reduction programming initiatives. They tend to communicate in non-dominant languages. They also live and work within systems where they may be viewed as "illegal" and do not wish to share their details or be traceable.

Digital profile: Migrants are likely to have a mobile phone that they use to message friends and family back home.[23] Given that many are undocumented and South Africa has stringent Know-Your-Customer (KYC) requirements for registering a SIM card, phone numbers may be used by individuals other than the registered owners.

21 Municipalities of South Africa. (2022). "Musina Local Municipality (LIM341)".
22 World Climate Guide. (n.d.). "Messina Climate Guide, South Africa".
23 GSMA and UNHCR. (2022). The Digital Worlds of Displacement-affected Communities.

Location 3
Rural areas outside East London

Predominant local language:
Xhosa

Overview:

The rural areas surrounding East London are among the poorest in South Africa.[24] Most communities rely on subsistence agriculture and social grants from the government. Spread over a large geographical area, this part of the Eastern Cape is known for poor municipal service delivery.[25]

Past disaster experiences:

Flash floods have become more frequent in the Eastern Cape province in recent years. Severe floods occurred in 2021, 2022 and 2023.[26] Most people do not have the money to rebuild homes between flooding events, resulting in unstable structures that are unable to withstand the next disaster. The communities that have settled on floodplains are the hardest hit.

Target research participants

Older people (60 years+)

Older people who live in rural areas have fewer options to respond to climate risks as they may not be the household decision-makers and may have limited mobility. Lower literacy levels among older people, stemming from apartheid-driven inequalities during their schooling years,[27] may limit their understanding of text-based risk communications. They are also likely to have lived in an area long enough to have a deeper understanding of the climate and to have experienced disaster events.

Digital profile: Most older people are not very tech-savvy and are likely to use a basic or feature phone. They mainly use mobile phones for making calls as they have difficulty reading small text.

Persons with disabilities

Persons with disabilities, including those with sight, hearing and motor impairments, often face barriers to receiving communication through channels like mobile phones due to their impairments.[28] This means they must frequently rely on others for information and in situations where they may need to physically relocate for safety.

Digital profile: The digital channels that persons with disabilities can interact with depends on their impairment. Sight impairments may rule out visual or text-based messaging, hearing impairments may affect calls and alert tones and motor impairments may limit one's ability to operate a mobile device. Challenges extend beyond direct interaction with technology. Issues related to education, employment and broader social inclusion all have a significant influence on digital accessibility. Intersectional disadvantages, such as socio-economic status or gender, can compound these challenges.[29]

24 Alexander, M. (20 October 2023). "Mapping Poverty in South Africa". South Africa Gateway.
25 Info SA. (2023). "Eastern Cape".
26 Biz Community. (21 February 2023). "Eastern Cape floods cause R4.5bn infrastructure damage".
27 Khuluvhe, M. (March 2022). Adult Illiteracy in South Africa. Higher Education & Training, Republic of South Africa.
28 Downer, M. (2019). Bridging the Mobile Disability Gap in Refugee Settings. GSMA.
29 GSMA. (2021). The Mobile Disability Gap Report; Nique, M. (2022). Driving the Digital Inclusion of Persons with Disabilities. GSMA.

04

The mobile landscape in South Africa

As of 2024, the mobile penetration rate in South Africa stands at 77.7%, with a mobile internet penetration rate of 62.15%.[30] These figures are represented by unique subscribers. According to the GSMA Connectivity Index, South Africa has 187% mobile connection relative to its population, indicating a high number of active mobile connections per individual. Network coverage is also robust at 92.2%.[31] With this broad adoption of mobile technology, tapping into mobile networks provides an opportunity to reach many segments of the population with preparedness information and early warning messaging.

However, nationwide electricity shortages disrupt mobile network operations while network coverage gaps, particularly in rural and remote areas, leave populations underserved. The affordability of mobile data and handsets is another challenge. South Africa's mobile data affordability score is 54.2 out of 100, and handset affordability is 43,[32] posing an obstacle to consistent internet access and, by extension, to critical information and risk communications via mobile channels. These challenges may be particularly acute for marginalised groups.

The major MNOs in South Africa are MTN, Vodacom, Cell C, Telkom and Rain, with Vodacom and MTN having the largest market share.

30 GSMAi data.
31 GSMA. (2022). Mobile Connectivity Index – South Africa.
32 Ibid.

05

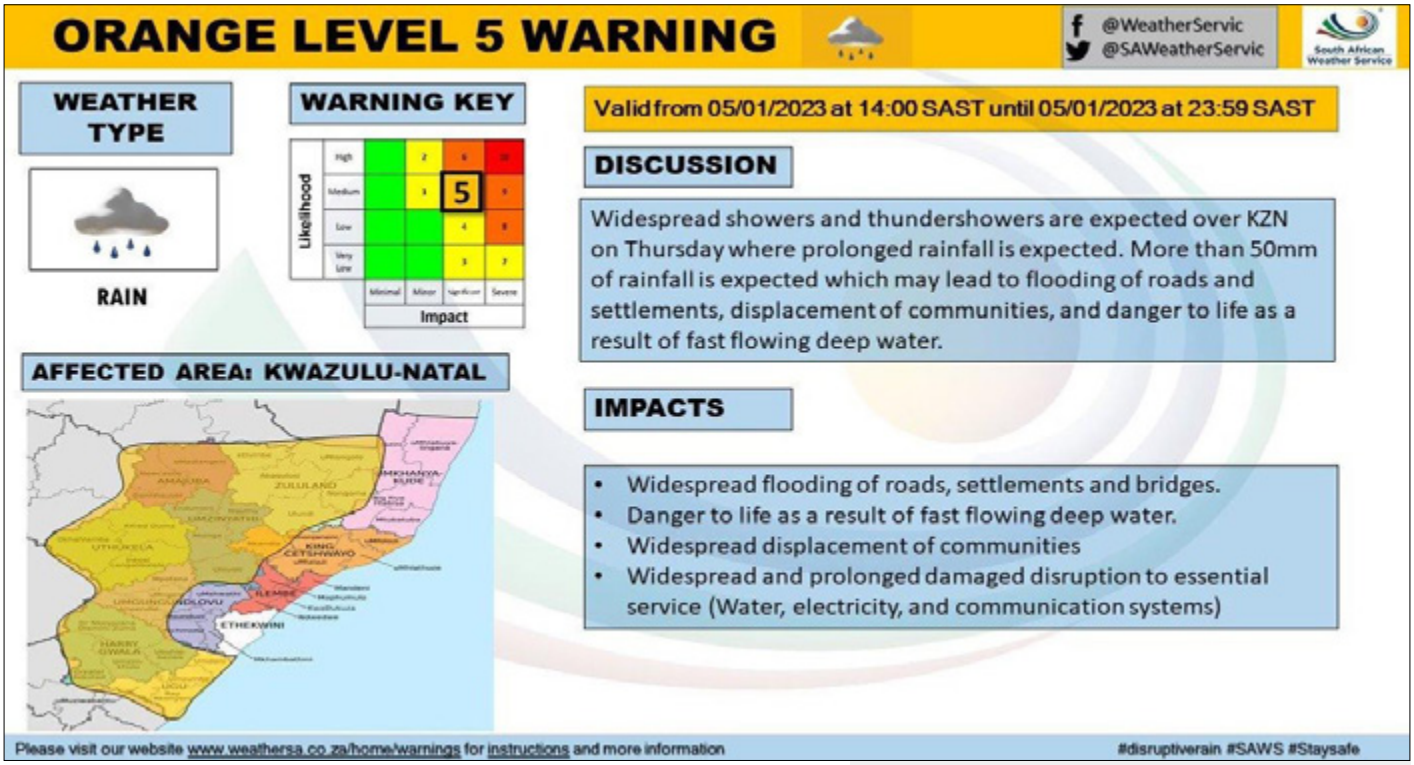
The EWS landscape in South Africa

This section provides an overview of the EWS landscape in South Africa, detailing the key stakeholders, components and operational frameworks.

Many organisations work together to provide early-warning communication and disaster support to communities across South Africa. This includes the South African Weather Service (SAWS), the National Disaster Management Centre (NDMC), Provincial Disaster Management Centres (PDMCs), as well as government bodies and committees at district and municipal levels.

South African Weather Service	National Disaster Management Centre	Provincial Disaster Management Centre
The SAWS is the country's meteorological service, which falls under the Department of Environmental Affairs and Tourism. It is the authority for all weather and climate forecasting in South Africa, as well as severe weather warnings.	The NDMC is a government body in charge of coordinating the response in case of a weather warning. One of their functions is to develop and roll out disaster management EWS.[33] They promote an integrated system of disaster management by national, provincial and municipal bodies, humanitarian organisations and communities.	Each province has a PDMC that follows a local framework to address disaster management issues in the province. They are responsible for establishing and coordinating on-the-ground disaster response between various committee stakeholders.

33 Sithole, E. (17 April 2023). "Overview of Disaster Management System in South Africa". International Dialogue Series on Disaster Management Systems. Cooperative Governance, Republic of South Africa.



Example of weather alert sent from SAW

In the days before hazardous weather, SAWS prepares forecasts and notifies the NDMC of any expected hazards using an Impact-Based Severe Weather Warning System.[34] This system uses a matrix to indicate the likelihood and likely severity of hazardous weather events. SAWS shares warnings directly with a variety of media channels, including TV, print media and radio stations, in addition to publishing warnings on their website and social media accounts.

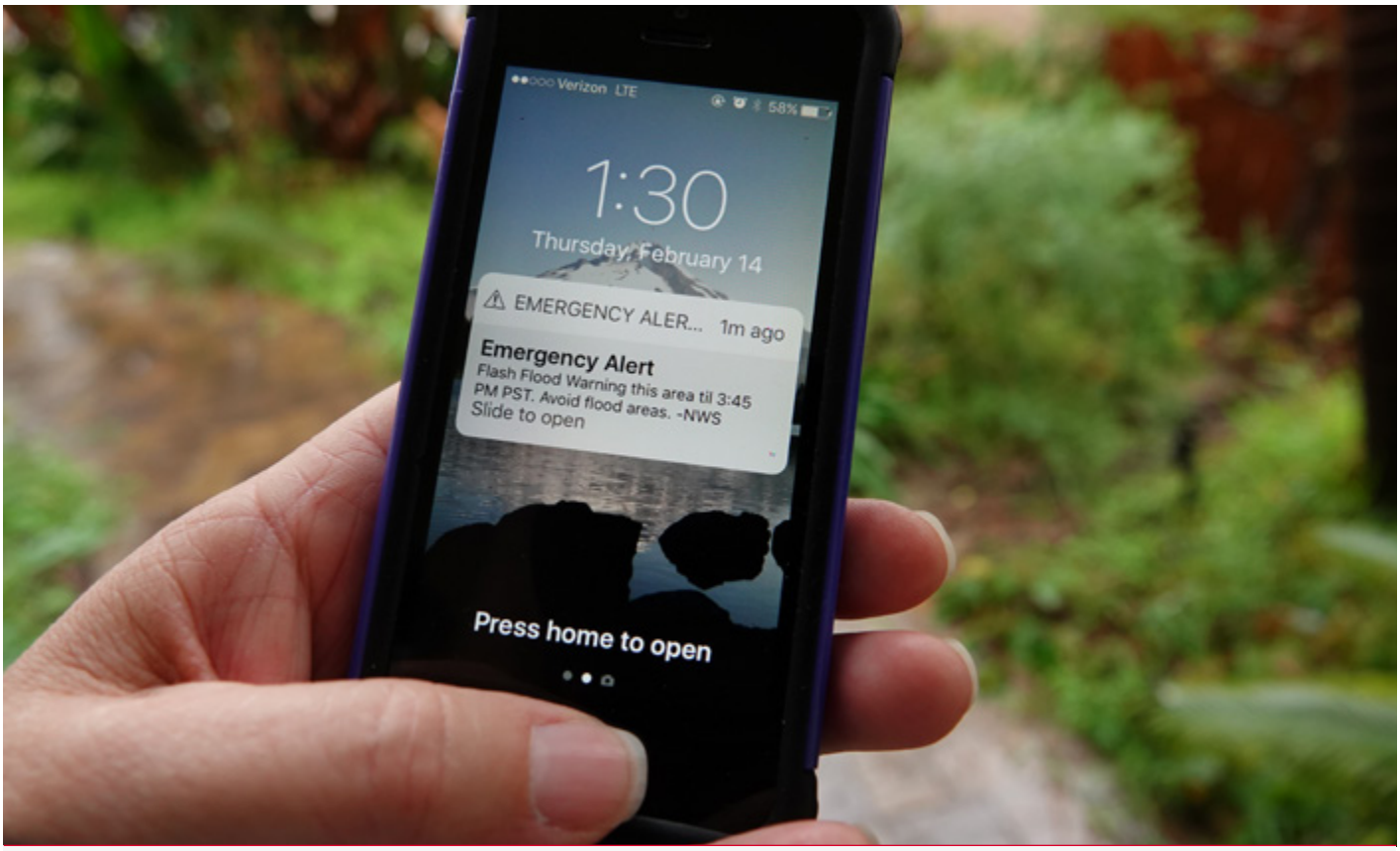
The NDMC coordinates the government's planning and response to the forecasted impact, convening auxiliary stakeholders from both the government and private sector. At the PDMC and local levels, planning takes place concurrently to establish joint operation centres, develop proactive plans and notify citizens via a variety of channels. These channels include municipal/local social media accounts, community radio stations or local organisations that share information directly with their members.[35]

SARCS is an auxiliary stakeholder that partners with the NDMC, PDMCs and local municipalities to help prepare for and respond to disasters. Following notification of potential weather events, SARCS leverages their National Response Team to disseminate risk communications from the head office to regional and local branches. These local teams activate teams of volunteers to educate community members on risk, make preparations before a disaster and recover after an event.

Mobile and digital technology play a role in the disaster response process at several points, including communication between various stakeholders at provincial and local levels, internal communication between SARCS and their volunteer groups when sending out warning messages to communities and post-event monitoring and evaluation. Communication can be challenging as it flows between national, provincial, district and local levels, all of which have a variety of stakeholders, and ultimately to the general public with coordinated messaging.[36]

Cell broadcast technology is not currently used in South Africa despite being recognised as an effective method for the dissemination and communication of early warnings. Appreciating that it may require investment into infrastructure, implementing CB could be considered to help South Africa disseminate more timely and targeted alerts to its population.

34 South African Weather Service (SAWS). Impact-Based Severe Weather Warning System (ImpB-SWWS) website.
35 Cooperative Governance & Traditional Affairs, Republic of South Africa. (30 June 2023). Efficiency and Gap Analysis of NDMC Framework (2005).
36 KIIs with SARCS branch managers.



Cell broadcast

CB is a technology used by mobile network infrastructure to communicate directly with mobile handsets through a one-to-many communication method, unlike the one-to-one method used by SMS (texts). CB does not require a phone number and allows for quick dissemination of messages, including emergency alerts, to devices based on location. This feature enhances privacy and ensures that even visitors, including those from abroad, can receive alerts. CB can broadcast messages up to 1,395 characters and has been recognised for its effectiveness in EWS.[37]

The strengths of CB include:

- **One-to-many:** CB allows messages to be sent from a single source to multiple devices in a network simultaneously, making it efficient for broadcasting emergency alerts.
- **Rapid distribution:** Messages reach millions of handsets swiftly without causing network congestion or being affected by traffic.
- **Geographically targeted:** CB enables messages to be sent to devices in a specific area, using network cells for a location-based approach.
- **Audible and visual alert:** Emergency CBs can trigger audible and visual alerts on handsets to capture attention without the need for manual activation.
- **Privacy conscious:** CB messages are sent anonymously and received without the need to reveal personal information, ensuring user privacy.
- **Difficult to spoof/reproduce:** CB messages are less prone to fraud as they are distributed through secure network channels and do not require user opt-in or subscriptions.

Innovations that will make CB more accessible and targeted are underway, including geofencing, text-to-speech capabilities and greater use of symbols and visuals.[38]

37 Parsons, O. and Hamilton, Z. (2023). Cell Broadcast for Early Warning Systems: A review of the technology and how to implement it. GSMA.
38 Ibid.

06
Personas

This section introduces four personas that emerged from the qualitative field research. Personas are a synthesis of what project teams learn about end users and their context. They are developed based on themes or common characteristics observed in the research, and are a representation of the needs, thoughts and goals of a project's target user.

The effectiveness of risk communications in the Reach Model depends on the interplay of many characteristics. Building personas helps to highlight the characteristics and potential barriers faced by different groups. A number of distinguishing features were identified when categorising barriers and deciding how to segment user groups for the personas. These features often intersect and include socio-economic status, access to technology, age, location, past experience with dangerous weather events and inter-community dynamics.

Using the personas, hypothetical "weather journeys" were created to illustrate how these features and barriers characterise each individual's experience of extreme weather. These narratives help to portray the personal experience of such events, illuminating the challenges they face.

PERSONA 1:
The post-disaster person

Nolwazi

LOCATION:
Durban, Urban/Peri-urban

AGE:
42 years

GENDER:
Female

FAMILY AND BACKGROUND: Nolwazi has lived on an old farm outside of Tongaat for just under a year. She is unmarried and the fathers of her children (5, 13, 18) are not around. She is in touch with her parents and her sister, but they live in the Eastern Cape where she grew up. Nolwazi's educational opportunities were limited and she completed only a few years of schooling. This has affected her employment prospects and daily life.

LIVING SITUATION: Nolwazi lives in a two-room shack. Her previous house, in an informal settlement on a steep hillside close to town, was washed away in the 2022 floods. She spent six months in a community hall before authorities relocated her and her family, along with others from nearby regions. Although Tongaat town is an urban part of the greater Durban metro area, her current residence on a farm on the outskirts is a more peri-urban setting.

JOB AND INCOME: Nolwazi previously worked as a domestic worker but has struggled to find a job since moving to this new area, which is farther away from opportunities. She receives a monthly government grant of 500 rand (R) per child, which she uses for their transport to school and food for the family. She also receives a monthly Social Relief of Distress (SRD) grant of R350 from the South African Social Security Agency (SASSA).

VULNERABILITIES: She has recently moved to a new community and rarely interacts with others, aside from a neighbour that she trusts. She is far from where she can earn income. She has yet to replace assets that were lost in the floods and is still using supplies that she received while staying at the community hall, such as old clothes, blankets and food staples. Despite the new house being in an area that is less prone to flooding, due to lack of money for sturdy building materials, it is not structurally sound. There is a lot of pressure on her to provide and make decisions for her family.

DIGITAL PROFILE: **Nolwazi has a basic mobile phone** that she uses for receiving calls and sending "Please Call Me" messages. She spends R10 per month on airtime.

She previously owned a smartphone that was damaged in the flood. She could not afford to replace it. Her son has a smartphone. He uses it for schoolwork and does not let her borrow it. ***"He won't even let me hold it. He's scared I'll look at private conversations."*** **– Woman, Durban**

Nolwazi used to have a TV and radio but lost them in the flood. She uses her phone to tune in to Ukhozi FM, the national Zulu radio station.

KEY INFLUENCERS

- Children
- Trusted neighbour
- Parents (not in-laws)
- Sister
- God

RISK PERCEPTION: Nolwazi feels extremely nervous about any weather that reminds her of the previous disaster. Having moved to a new area that is on higher ground, she feels she is less likely to experience flooding but is aware that her shack is not well constructed and that she is still vulnerable in the event of any bad weather.

Nolwazi's weather journey

Before the disaster

- Nolwazi received no weather warnings before the rain started.

During the disaster

- She saw the rain start and thought it was normal, but the rain continued through the night.
- Her neighbours' houses near the river started to flood.
- Her sister phoned to check in because she heard about the heavy rain.
- The walls of her house began falling in and she felt worried.
- She gathered her children and went to stand on the side of the road with her neighbours.
- Her house collapsed with all of their belongings inside.

Post-disaster

- Emergency services arrived 24 hours later.
- They relocated her and her family to the community hall.
- She was not allowed to return to the area where her house was.
- Other than the clothes they were wearing, Nolwazi's family lost all of their belongings.

Top barriers

Nolwazi has a **low level of literacy** because of limited schooling.

She does not know or **trust** her new community members.

She does **not have an internet-enabled phone or TV** to get timely warnings.

She **struggles to tell the difference** between bad and severe weather.

Her **lack of financial resources** limits the actions she can take.

PERSONA 2:
The undocumented migrant from Zimbabwe

Tinashe

LOCATION:
Musina, Peri-urban

AGE:
25 years

GENDER:
Male

FAMILY AND BACKGROUND: Eight years ago, Tinashe crossed the Limpopo River from Zimbabwe into South Africa to look for work and create a more stable life. He has a wife and three young children in Zimbabwe he is trying to support. His home language is Shona and he also reads and speaks some English.

LIVING SITUATION: As an undocumented migrant, he has struggled to integrate in the local community. He stays in a migrant shelter provided by a local church with 70 to 100 other men of similar age. This free shelter provides only basic bunk beds. The ceilings and walls are covered in corrugated zinc sheets, which often leak in the rain or become loose in high winds. The shelter has a security guard whom Tinashe has come to trust as a key source for local news, information and guidance.

JOB AND INCOME: Despite the prospect of better earning opportunities in South Africa, Tinashe has struggled to find work and a stable income. He is a piecemeal worker, seeking out daily handyman and construction jobs. Every day, he waits with other migrants on a street corner where those seeking labour can request services. He earns roughly R100 per day but is only able to secure jobs a few times a month. As an undocumented migrant, he does not qualify for any social support from the South African government.

VULNERABILITIES: Tinashe has no family members with him in South Africa and feels isolated. Despite making friends with other migrants living in the shelter, they view each other as competition for limited work opportunities. There have been times when Tinashe has been taken advantage of by local residents who stole his possessions or refused to pay him after a day's work. When incidents like these happen, he feels unable to seek out support from the police because of his immigration status.

DIGITAL PROFILE: **Tinashe does not own a mobile phone.** He previously owned a smartphone when he was in Zimbabwe, but he sold it when arriving in South Africa to help pay for urgent expenses. He does not have any close friends who have a smartphone, but he occasionally borrows a basic phone to text or call his family in Zimbabwe. He has no access to a TV or radio.

KEY INFLUENCERS

- Peers living together in the shelter
- Shelter security guard

RISK PERCEPTION: Tinashe knows that Musina can have heavy thunderstorms but has never experienced a serious flood. Moreover, the weather is usually dry in the region. Because of his exposed living arrangements, he is vulnerable to whatever the weather may bring. While he knows this is a risk, the weather feels like a minor consideration compared to the other challenges he faces, such as securing food and safety. Tinashe feels disempowered to take action should a more serious weather event take place.

Tinashe's weather journey

Before the disaster

- Tinashe lives in a shelter with limited access to technology and receives no formal warnings of dangerous weather.

During the disaster

- When heavy rain starts falling overnight, Tinashe is unable to sleep.
- His bed and limited belongings become wet as water leaks through the roof.
- If winds get stronger, those who live in the shelter often stand and huddle together near the centre of the room as the zinc wall sheets rattle around them.
- If the rain continues for too long, the water begins to rise around the feet of the residents. Their key focus becomes protecting their few possessions.

Post-disaster

- The migrants work together to fix the damage to the shelter, but with limited resources they often have few options for replacing or restoring building materials.
- Wet items are laid out to dry in the sun, but the possibility of theft poses a security issue.

Top barriers

Because he **does not own a phone**, it is difficult to reach Tinashe.

Tinashe has **no other communication devices, like TV or radio.**

As a migrant, Tinashe **feels stigmatised by local residents**. He does not have close relationships with them and does not turn to them for help.

Likewise, he **cannot turn to local government officials** for assistance.

There are **language barriers** that make it difficult for him to understand local information, which may be in Venda or Afrikaans.

Documented vs. undocumented migrants

Although the majority of participants in the workshops were undocumented (i.e. they crossed the border without a passport and entry stamp), the project team interviewed a few documented migrants. While sharing some of the challenges related to language barriers and a lack of economic opportunities, documented migrants tended to be more integrated into local communities, having built deeper relationships with neighbours and, at times, South African spouses. Generally, they had higher levels of income and digital technology ownership.

PERSONA 3:
The urban youth

Mthetho

LOCATION:
Durban, Urban

AGE:
23 years

GENDER:
Male

FAMILY AND BACKGROUND: Mthetho lives in Tongaat, just outside of Durban. He still lives at home with his mother, who is the key decision-maker of the family, and his two younger siblings. His father lives and works in Johannesburg and is not around much. He has a girlfriend that he sees every week, but she still lives at home with her mother.

LIVING SITUATION: Mthetho lives in his mother's three-room shack made of corrugated iron in a densely populated informal settlement. It has electricity, which has been illegally wired. His mother pays for most of the household expenses and does all the work around the house. Most days, Mthetho is away from home looking for work, playing soccer and card games with friends or out drinking and playing pool at the local tavern. When at home, he will sometimes help his siblings with their homework. The area they live in is densely populated and there is a high rate of crime.

JOB AND INCOME: Mthetho completed schooling up to age 17 and since then has picked up irregular work, such as gardening or washing cars. Jobs are hard to come by. He earns around R120 a week, most of which he spends on beer and cigarettes. If there is some money left over, he might give it to his mother for food. He receives a monthly government support grant of R350 from SASSA since he is unemployed.

VULNERABILITIES: Mthetho is often away from his home, looking for work or socialising with friends. He cannot always be contacted, as he sometimes switches off his phone or loses battery. It is difficult for him to keep his phone charged due to scheduled electricity cuts known as "load shedding". The structure he lives in with his family is not well built and is in a low-lying area, putting it at high risk of flooding. Living in an urban area, he faces higher levels of crime and more personal security risks.

DIGITAL PROFILE: **Mthetho has a smartphone.** He uses it for going on the internet, scrolling on Facebook Light in data-free mode, chatting to friends on WhatsApp, making and receiving calls, using the data-free MoyaApp to get his SRD grants and placing sports bets online. Sometimes, he goes on Instagram and TikTok. He spends R20 on data and R10 on airtime per week. He might borrow money from the networks if he is low on money. There is a TV and radio at home. He has an old laptop that was given to him by his mother's employer.

KEY INFLUENCERS

- Friends
- Mother
- Neighbours
- Girlfriend

RISK PERCEPTION: Mthetho knows that the area is prone to some seasonal flooding in the summer months. His home is made of materials that are not weatherproof so he expects to experience some damage every season. He is concerned about his belongings being destroyed while he is out due to poor weather conditions. He feels less at risk than his neighbours who live closer to the river and usually experience flooding before he does.

Mthethos's weather journey

Before the disaster

- Mthetho sees on MoyaApp that rain is due today.
- He still goes out to look for work as it is the rainy season and he needs the money.

During the disaster

- Later in the day, a friend sends him a WhatsApp message saying that the rain has gotten heavier and he rushes to take a taxi home.
- His mother tells him she has heard about heavy rain on the radio.
- He helps his mother by digging trenches around the house to redirect the water.
- When they hear thunder, his mother covers all the shiny objects and mirrors in the house so the lightning does not strike.
- He moves the furniture into the centre of the room to stop it from getting wet and stacks their clothes as far away from the ground as possible.
- When water starts to seep into the house, he takes their important documents and a few valuable items to their neighbour's house, which is on higher ground.
- Mthetho feels worried about the structure of the house, but does not want to leave it as this can be an opportunity for thugs to steal belongings. ***"If you have nowhere to go, you can't leave."*** **– Youth, Durban**

Post-disaster

- He dries out any items that got wet during the flood.
- He helps his mother by doing some basic repairs to the structure of the house.

Top barriers

He is **digitally connected but not consistently**.

He is unemployed and has **limited access to financial resources**.

He is often **away from home, which limits his ability to take timely action**.

Crime in his area **limits the actions** he is willing to take.

PERSONA 4:
The elderly grandmother in a rural village

Mama Nobuhle

LOCATION:
Mkhubiso, Rural

AGE:
79 years

GENDER:
Female

FAMILY AND BACKGROUND: Mama Nobuhle was born and raised in the small hilly village of Mkhubiso in the Eastern Cape province of South Africa. The village is about a 90-minute drive from the larger urban area of East London. Growing up during apartheid, her access to education was restricted. Mama Nobuhle has lived a long life, raising two children who are now adults and have children of their own. Her grandchildren are her pride and joy and her goal is to provide them with a better life. She is their primary caretaker and ensures they are fed and go to school each day. Her husband died 10 years ago.

LIVING SITUATION: Mama Nobuhle stays in a thatch-roofed rondavel with her three grandchildren. The walls are made of dried mud and the floor is made of poured concrete. The house has electricity and she shares a communal water tap with her neighbours.

JOB AND INCOME: Mama Nobuhle used to work at a factory in a town about 30 minutes away, but is now retired. She receives R2,000 each month as a pensioner and collects R500 per grandchild each month as a government grant.

VULNERABILITIES: Mama Nobuhle struggles at times to make ends meet with her small monthly welfare payments. She and her peers feel the challenges of old age but must remain active to take care of their grandchildren. She is frustrated with her adult children who have left the village to look for work in Cape Town. “Who knows if they work at all, or if they just drink it all away. They never take care of me.” – Older person, East London

DIGITAL PROFILE: **Mama Nobuhle has a basic mobile phone.** She uses it for receiving calls and listening to the radio. She keeps her phone charged for emergencies. However, given her age, she struggles to see well or type on the phone. Connectivity in Mkhbiso is often unreliable. She spends R30 per month on airtime. Her eldest grandchild has a smartphone, which Mama Nobuhle feels is important for learning and keeping up with peers. She is amazed that her granddaughter knows how to use the phone and occasionally asks her to use it to look up information. She has a TV and watches the news broadcast in Xhosa every night. She also listens to the national Xhosa radio station, Umhlobo Wenene FM.

KEY INFLUENCERS

- Neighbours
- Grandchildren
- Chief and village elders
- Church

RISK PERCEPTION: Having lived in this area all her life, Mama Nobuhle knows how severe and unpredictable the weather can be. A bit of seasonal flooding is considered normal. Her home cannot withstand big storms and she feels that she and her grandchildren are especially vulnerable since they are less physically able to take action.

Mama Nobuhle's weather journey

Before the disaster

- In the late afternoon, Mama Nobuhle's neighbour points out the irregular cloud patterns and mentions that her joints are hurting – signs that rain must be arriving soon.
- Mama Nobuhle watches the weather news on the TV at night and hears it will rain overnight, but she cannot tell how serious it will be.
- She uses plastic sheeting to cover the grandchildren who sleep on the floor so they do not get wet.

During the disaster

- It has rained throughout the night and water is now seeping in through her mud walls.
- As the water rises, she moves important items to higher areas in the rondavel and covers them with plastic.
- She puts down buckets to catch water leaking from the roof and redirects the water using a trench she digs outside her front door.
- Mama Nobuhle sends her grandchildren to her neighbour who lives on higher ground. She lives in a close-knit community and neighbours often help each other out in times of need.
- Mama Nobuhle sits in her house crying, waiting for the storm to end. She feels very worried about her mud house walls as they can easily collapse in weather like this.

Post-disaster

- She approaches her municipal ward councillor to ask for help with fixing her home but is told to wait.
- After two weeks, she gets no response and she knows help will not be coming from the government.
- Her neighbour, who is younger and physically stronger, helps her to fix the roof and reinforce some walls that were damaged by the water.

Top barriers

Rural **network connectivity is sparse**. She cannot be reached quickly via mobile.

Poor sight and low literacy mean she cannot read written communication.

She **struggles to tell the difference** between bad and severe weather.

The weather in her area is hyperlocal, so **forecasts can seem inaccurate** or are not relevant.

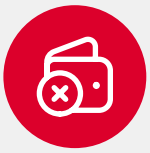
The **physical limitations** of old age make it hard to take action on her own.

She has **few financial resources** to take action.

Persona takeaways

The four personas highlight key factors that influence how people access, understand and act on risk communications related to dangerous weather events, including early warnings. They represent key segments of the population, and while the findings are tied to specific personas, many of their experiences reflect those of others who may not fall neatly into one persona.

Key factors to consider when designing risk communications include:



Socio-economic status: Access to technology is influenced by socio-economic status, with lower-income individuals having fewer digital touchpoints for communication and less capacity to respond to weather events. The individuals we spoke with often faced more immediate concerns, such as food security and employment, making it challenging to prioritise weather-related information or take action, even with timely warnings.

Age: Younger individuals tended to be more digitally connected and digitally savvy than older people. Those between the ages of 18 and 40 were more likely to own and use smartphones compared to those over the age of 50.

Location: In rural areas, infrastructure challenges like weak mobile network coverage and unreliable electricity hindered community EWS messaging, but there was a strong sense of collective responsibility to share important information and support neighbours. Conversely, urban areas benefitted from faster information but faced greater security risks, which can drive people to focus on protecting their property rather than taking pre-emptive action before a weather event.

Past disaster experience: Those who have experienced loss or damage in the past struggle to replace assets like TVs and smartphones, reducing their digital touchpoints. Additionally, post-disaster relocations leave them in unfamiliar communities. However, having experienced the consequences of natural disasters first hand, they have a higher risk perception, potentially motivating more proactive responses compared to those from less-affected areas.

Relationships with other community members: Those who have migrated or relocated due to disasters often experience disconnection from their new communities, leading to mistrust among neighbours, limited connectivity with local government and, for foreign nationals, stigmatisation and language barriers. These factors significantly hinder communication and motivation to act on impending weather events.

Limitations and considerations on gender and disability

When initially designing this research, it was hypothesised that demographic factors such as gender and physical disabilities would influence individuals' experiences with risk communications. However, limitations in the research prevented a full exploration of these aspects. As a result, personas were not developed to specifically represent these groups, and findings are not able to reflect experiences specifically related to these factors.

Gender

Women included in this research were recently impacted by severe flooding, and their responses were heavily influenced by this experience. Consequently, the post-disaster context overshadowed any gender-specific barriers they might have faced in accessing risk communications in their responses in focus groups. Nevertheless, recognising the diversity within women's experiences, gender norms likely create additional challenges. Systemic gender issues, such as disparities in education[39] access to mobile technology[40] and high levels of gender-based violence[41] are well-documented in South Africa. Other research has highlighted the role gender plays in EWS and the need to consider the unique barriers faced by women in EWS[42]. Further research should explore gender-specific barriers to risk communications, especially considering women are more impacted by disasters than men[43].

Disability

The study initially aimed to engage individuals with physical disabilities to understand their experiences with risk communications. However, the participants that the research team was able to recruit had cognitive disabilities and were heavily dependent on their caregivers or institutional support. This dependency meant that their access to risk communications and any subsequent actions were mediated by others, limiting the team's ability to capture unique, personal experiences. Additionally, the lack of participants with other types of disabilities, such as visual or auditory impairments, further limits the findings presented here.

Existing research highlights how disabilities affect access to technology[44] and the systemic barriers to participating in EWS and Disaster Risk Reduction (DRR) programming[45]. The recruitment difficulties suggest that existing risk communication programmes may likewise struggle to reach these marginalised groups. Furthermore, the dependency observed in participants implies those without support may face unique challenges. Despite the significant number of people with disabilities worldwide, efforts to create disability inclusive EWS are minimal[46]. More studies are needed, particularly focussing on those living independently. Effective inclusion of people with disabilities in risk communication strategies will require additional resources, specialised skills, and collaboration with intermediary organisations that have expertise in working with diverse disability groups.

39 Mdelelni,L. et al. (2021). Tenacity of Gender Inequality in South Africa: A Higher Education Perspective. Centre for Global Education.
40 Rowntree, O. (2019). The Mobile Gender Gap Report. GSMA.
41 Department of Statistics South Africa. (n.d.). Crimes against women in South Africa, an analysis of the phenomenon of GBV and femicide.
42 Brown, S. et al. (2019). Gender Transformative Early Warning Systems: Experiences from Nepal and Peru.
43 Practical Action. Okai, A. (2022). Women are hit hardest in disasters, so why are responses too often gender-blind?
44 Hamilton, Z. et al. (2020). The digital lives of refugees and Kenyans with disabilities in Nairobi. GSMA.
45 Batchelor, C. et al. (2021). Towards disability transformative early warning systems: Barriers, challenges and opportunities. Practical Action.
46 Ibid.

07

Key findings

This chapter presents key findings from the Reach Model that identify the barriers and opportunities associated with effective risk communication, and how different communication channels, messaging sources and content formats influence how participants receive, trust, understand and act on vital information.

While this research was conducted to understand the barriers faced by marginalised groups, the findings cannot be attributed exclusively to one aspect of an individual's identity, due to the intersecting nature of identity and often overlapping characteristics of marginalisation. While findings are often tied to particular groups or personas within the context of this research, individuals in other contexts may face similar obstacles due to factors like geographical location or lack of community ties, even if they do not fit neatly into these personas.

Awareness and reach

The first component of the Reach Model is awareness and reach – how communities access or are reached with important weather information. This primarily concerns the communication channel through which information is disseminated. Weather broadcasts from TV and radio news stations, together with weather information spread via smartphones, are the main channels through which day-to-day weather information reaches communities.

Limited access to technology excludes marginalised communities from receiving weather information first hand. Still, digital channels play a vital role in reaching communities with information, which is then shared among community members through interpersonal networks and word of mouth.

With the exception of young people, **many of the groups we spoke with had limited access to technology and, therefore, did not often receive weather information or risk communications digitally.** While weather and risk information are spread through a combination of digital and community channels, in all research locations, people noted that they rarely, if ever, have received "special" communication ahead of severe weather events.

Consistent with findings in other humanitarian contexts,[47] in all three research contexts, **financial barriers were often cited as a significant impediment to accessing and owning smartphones, feature phones and TVs**. Despite a nationwide smartphone penetration rate of 144.7% in South Africa,[48] older people, migrants and those recently affected by disaster faced barriers to regular mobile phone access. Young people, however, were more digitally connected and often reported acting as connectors for their communities, passing along vital information.

Even for those with access to internet-enabled mobile phones, **high data costs mean that most low-income users only turn data on to check messages sporadically throughout the day**. Towards the end of the month, many people reported running out of data altogether. This may pose challenges for EWS channels that rely on data-enabled apps or social media.

"I have a smartphone. My daughter-in-law bought it and put WhatsApp on it. But I don't use it because I don't have money for the data. When it's charged, my child plays games on it."
– Woman, Durban

People with informal or transient living arrangements who have lost assets or experienced theft also reported being less likely to own a mobile phone or TV. Among migrants, and those recently affected by disaster, assets like technology had often been lost, stolen or damaged. In many cases, these had not been replaced due to insufficient funds. In fact, **approximately half of the migrants who participated in focus groups did not own a mobile phone**. Many reported selling their smartphones upon arriving in South Africa to generate some quick income and have not purchased a new one. This may be due to difficulty finding work and most employment being low-paid, piecemeal jobs. Those who did own a mobile phone usually had basic or feature phones.

Despite the lack of widespread smartphone ownership among migrant communities, **WhatsApp groups are commonly used for sharing information.** Migrants with smartphones are often members of a variety of messaging groups with hundreds of others. These groups are used to share information about work opportunities, documentation, living accommodations and more. However, messages are often ignored or missed, with some members muting the group due to message overload. Members reported that these groups tend to be filled with spam, making them less effective channels for conveying information. Some groups provide one-way communications from official sources like the local government and were seen as less intrusive.

In Durban, **older people's access to technology is inhibited by financial barriers as well as low digital literacy**. This was largely due to limited income and the need to provide for their grandchildren. They overwhelmingly did not own smartphones or receive weather information via digital channels. However, they reported owning basic mobile phones and receiving information via phone calls from family and friends. Older participants expressed that it is a priority for them to keep their phones charged so they can be reached in case of emergency.

"If I don't have electricity, I'll ask my neighbour to charge my phone. We love our phone, so the battery is always full."
– Older person, East London.

47 GSMA. (2019). The Digital Lives of Refugees; GSMA and UNHCR. (2022). The Digital Worlds of Displacement-affected Communities.
48 GSMA Intelligence. (2024). "Mobile internet user penetration in South Africa from 2020 to 2029". Statista.

Although older people in this research appeared much less likely to use smartphones themselves, many participants reported having grandchildren who do and who share information with them.

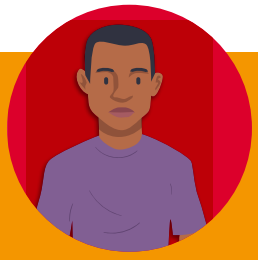
Mama Nobuhle:
Elderly grandmother in rural village

Mama Nobuhle does not seek weather information but owns a basic mobile phone and can be contacted in an emergency. Sometimes she speaks to her daughter in Cape Town on the phone, who tells her important information, but the signal is not always reliable. Her grandchildren who live with her have smartphones, but Mama Nobuhle does not feel confident using one. Although she would like to learn, her grandchildren do not want to share their phones with her. Sometimes they read out information to her from social media.

Access to mobile technology is also hindered by network instability and charging ability. Scheduled electrical outages, or "load shedding", are frequent occurrences across South Africa due to electricity shortages. These power outages not only limit access to TVs and phone charging, but also disrupt communications infrastructure, including mobile networks. Respondents in rural areas shared that mobile networks are often unreliable and power cuts compound the problem.

"Sometimes after storms, our power can go out for one to two weeks at a time, in which case we can't make or receive any calls."
– Older person, East London

Even when communities have regular access to mobile technology, reaching some marginalised communities can be a challenge. For example, when municipalities send EWS messages via mobile phones, they often use a list of phone numbers of the property owners whose names are linked to utility bills. SARCS reported that people with informal or transient living arrangements are often missing from these types of databases. Migrants and recently displaced groups are particularly unlikely to have their names on utility bills due to insecure or changing residences. Undocumented migrants often use different names for such services, borrow utilities or live in shelters, which means the warning messages often fail to reach them. The same applies to informal renters – of which there are many in townships – whose names are often not on utility bills.



Tinashe:
Undocumented migrant

Tinashe does not own property and currently stays in a shelter. He does not have a mobile phone but often hears about important community information and weather from other men in the shelter. When Musina municipality sends out a bulk SMS alerting the community to heavy rain and strong winds, none of the men at the shelter receive it. When the rain comes, they are unprepared. Water leaks through the zinc roof and rises around their feet, ruining their belongings. Wind rattles the zinc walls, keeping them awake at night and causing further damage.

Many participants in marginalised groups reported relying on public and interpersonal channels of communication, as **awareness of weather information shared on digital channels often filters through communities via word of mouth.** This means that even though participants in all groups did not have consistent access to mobile devices (particularly smartphones), **mobile phones are still one of the most effective ways to spread information quickly.**

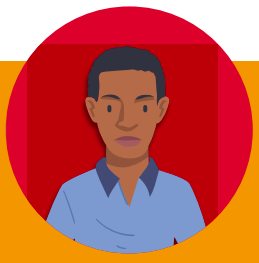
"These days, everyone is connected to information, whether you have technology or not."
– SARCS staff.

Between family members and neighbours, there is often someone with a mobile phone, and close-knit community structures help to spread information quickly.

Of all the groups in the research, **youth were most likely to have a smartphone and act as a first point of contact for weather information**. Data-free communication apps such as MoyaApp and Facebook Lite, where users can also access other services and information like weather, are popular among youth as they allow them to stay connected.

"I check the weather daily on MoyaApp, even if I don't have data."
– Youth, Durban.

Those with families reported prioritising giving a smartphone to school-aged children so that they can go on the internet to do their homework. Many of the youth we spoke with have grown up with access to a smartphone and have high levels of digital literacy.



Mthetho:
Urban youth

Mthetho has a smartphone and shares weather information with friends and family. Owning a smartphone is a priority for Mthetho as this is how he consumes most of his media and stays socially connected with friends. He is out looking for work when he sees that heavy rain is coming on the MoyaApp. He rushes home to tell his mother so they can build trenches around their house to protect it from the rain.

A lack of strong social support networks can be a barrier to accessing important information. Transient groups such as migrants and those recently displaced from a disaster are less likely to have strong community networks and therefore less likely to access information via word of mouth.

Nolwazi:
Post-disaster person

Nolwazi has limited access to digital technologies because she recently lost all her belongings in a flood. Nolwazi lost her smartphone and TV in the 2022 flood and has not had the money to replace them. She often accesses radio through her basic feature phone. Nolwazi recently moved to a much more rural area where there are fewer people than she is used to. She is less established in her new community and rarely interacts with others, aside from a neighbour that she trusts. For Nolwazi, this makes accessing information via word of mouth, particularly local information, more challenging.

"Even now we are affected by this. We have not replaced what we lost."
– Woman, Durban

Trust

The Trust element of the Reach Model explores the degree to which people trust the source and content of the message and, therefore, believe the information, feel confident sharing it with others and take the necessary action.

Unlike financial or political information, weather is viewed as a low-risk topic in terms of potential fraud or disinformation. However, trust in weather information depends on the channel of communication and information source.

Traditional forms of media such as TV or radio were noted as the most trustworthy and "official" channels among all research participants, except migrants who did not specifically mention these channels when asked about their trusted sources of information. Respondents also reported that **trust is reinforced when the same information is shared through multiple channels** and when information flows through existing community practices and channels. Among rural populations, chiefs and village elders are highly respected and important links in the chain of communication. Many noted that it is important for chiefs and leaders to be made aware of pending weather events, as they can reinforce and confirm information sent to other residents via mobile phones, TV and radio.

In both urban and rural communities, people were already familiar with several warning mechanisms. In Mkhubiso, for example, village elders convene urgent meetings by ringing the church bell. This was highlighted as a trusted way to share information related to an impending weather-related emergency. In other rural areas, residents notify others of crimes or fires by banging pots – a sound that others then repeat to spread warnings more widely. Likewise, given the regularity of scheduled electricity cuts in the country, many people regularly turn to mobile apps or media channels that share the times and locations of the cuts. These communication channels have become ingrained in people's daily routines and habits. Many of these communication channels have potential to be used or adapted for EWS. A multichannel approach also helps to create a sense of urgency as the message is communicated frequently.

Research participants noted that their **trust in several communication channels has been diminished due to the prevalence of fraud and scams**. All groups reported that SMS and automated phone calls were frequently used as phishing tools, for example, to capture financial data in return for false promises of winning the lottery or receiving transferred funds.

"We're always 'winning' competitions we don't even enter."
– Migrant, Musina.

This often results in mobile phone owners ignoring or deleting SMS texts from unknown numbers before reading them, or hanging up immediately upon realising a call is pre-recorded. Risk communications received in this way are likely to run the same risk. Older people are especially prone to being targeted by scams that use calls and SMS. Many older participants recalled scams that they and their peers have received.

Mama Nobuhle:
Elderly grandmother in rural village

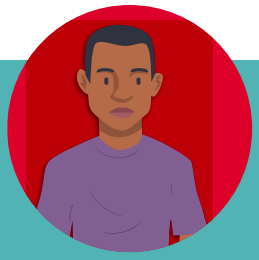
One afternoon, Mama Nobuhle received a call from someone who claimed to be from a well-known bank, informing her that she had won a prize in a promotion she had entered. The caller instructed her to provide her bank account details and other personal information to claim the prize. She did not remember entering any competitions so ended the call. She shared her experience with her neighbours, warning them to be wary of similar calls. As news spread, the community became more alert. In Mkhubiso, where Mama Nobule lives, almost all of her peers have encountered similar phishing attempts via messages or calls, making them extra cautious about unknown communications on their phones.

Trust also depends on the source of information. The country's meteorological services, such as SAWS, were regarded by the marginalised groups in this research as reliable sources of weather forecasts and updates. Numerous participants mentioned that seeing the SAWS logo or watermark on weather information received on their mobile phones would increase their confidence in its legitimacy, as opposed to information that appears to be drafted and forwarded by friends, family or community WhatsApp groups. Thus, while community networks are effective at spreading official information, it may be important to signal that the information is legitimate and comes from an official source.

People reported that they appreciate the science and expertise behind SAWS and official forecasts. Likewise, when trusted organisations like SARCS or other active community-based groups communicate information, it is generally viewed as more credible.

"We trust the Red Cross from previous experiences – they've helped us before."
– Elderly person, East London

However, there is often mistrust between the local government, South African citizens and migrant communities. Migrants believe they are regularly excluded from official communications, meetings and opportunities from the municipality. Migrant participants shared that they do not feel welcome.



Tinashe:
Undocumented migrant

A fellow resident at the shelter sometimes lends Tinashe his mobile phone and shares information with him. The phone received an SMS invitation to attend a community meeting. When they arrived, they were told the meeting was only for South African residents. Instances like these, together with examples of being ostracised by South Africans, make Tinashe more sceptical of official communication from the local government and from unknown local citizens. Likewise, he feels unable to turn to local authorities or community members for advice and information.

While Indigenous knowledge and beliefs about weather exist and were referenced in the three research locations, participants said they are not viewed as credible ways to predict the weather. Participants noted a variety of indications that rain or storms may be approaching, including feelings in one's joints or bones, flight patterns of birds and butterflies, cloud formations, temperature shifts or the behaviour of cattle. Despite the perceived reliability of many of these indications, it was consistently noted that they are rarely used to determine how strong or damaging a weather event may be.

Understanding

This section explores findings related to the degree to which marginalised communities understand weather-related information and risk communications.

Many marginalised people face weather literacy barriers that prevent them from understanding risk communications, and some groups face additional unique barriers, including language and vision.

Due to the historical education policies of apartheid, **low literacy levels are particular challenges for marginalised groups in South Africa**. Those over the age of 40 in particular reported lower literacy levels and struggled with understanding written forms of communication. Some had no education while others had lower levels of formal schooling, which limited their ability to engage with text-based communications.

All research participants demonstrated low levels of weather literacy, despite an acknowledgement that weather plays an important role in their day-to-day life. In the FGDs and co-creation workshops, probability, often displayed as a percentage, was consistently misunderstood to represent severity rather than likelihood. However, people were curious to learn more about interpreting weather information, apps, icons and terms.

"Sometimes it is difficult to know the difference between a normal weather situation and one that is going to be really dangerous."
– Youth, Durban

It was suggested that **verbal communication could enhance understanding and better communicate the potential severity of weather events.** Numerous participants shared their appreciation for how TV and radio weather broadcasts convey more detail about when, where and how severe weather will be, often through the inflexion and tone of the presenter's voice. However, it is important to note that pre-recorded voice calls are not well trusted and unlikely to be an effective verbal communication channel.

Weather information often includes the use of icons. However, research participants from all three research sites were consistently unclear on what various symbols were meant to represent. Risk communication for severe weather events that uses these symbols may be misunderstood. Instead, participants said they would prefer icons that depict the impacts of weather rather than the weather itself. For example, very few participants were able to identify wind by the symbol of airstreams (Figure 1) that are typically used in weather apps. Instead, there was a strong preference to represent wind with a tree with blowing leaves or curtains whipping. Likewise, for cyclones, no one associated the typical icon of a hurricane with a cyclone (Figure 2). Instead, participants suggested showing the damaging impacts of cyclones, such as roofs blowing off, hail hitting windows, water carrying away livestock or streams flowing through houses. In some cases, participants felt that using visual icons together with words would enable understanding across a variety of groups.

Figure 1:
Typical image of wind

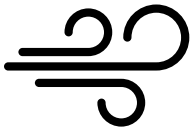
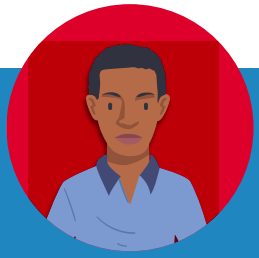


Figure 2:
Typical image of a hurricane

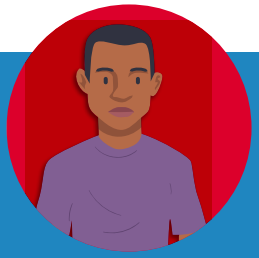


Mthetho:
Urban youth

Youth have higher levels of education than their parents and are more visually literate. While certain weather terminology is still difficult for Mthetho to understand, he is usually better at interpreting weather reports and is more likely to identify the weather icons correctly, having grown up with technology that uses these types of simple icons.

People with vision or dexterity challenges may face particular barriers to using mobile technology to access weather-related risk communications. Among the research participants, older people highlighted how loss of vision and dexterity made it difficult to read small screens or type messages on their phones. Given this, **calls and voice messaging are also helpful in reaching older populations.** A number of older participants mentioned that they can also ask their grandchildren to read messages to them. Youth in the community are, in many ways, important connectors to older people.

Language barriers can also pose challenges to reaching people with risk communications. Migrants in particular reported facing language barriers. South Africa has 12 national languages, many of which have multiple dialects (Zulu, for example, has four) and many people communicate using a combination of languages and dialects. This means there are 30 living spoken languages in total.[49] This linguistic diversity means it can be challenging to ensure everyone can understand risk communications.



Tinashe:
Undocumented migrant

Language in the border town of Musina is complex. Tinashe is a native Shona speaker, but thanks to linguistic similarities, he can communicate to some extent with speakers of Zulu, Xhosa and even Venda, which is one of the most prominent languages in Limpopo province. However, verbal communication is different from written, and he struggles to read Venda. With many of the official warning messages communicated in written Venda, he is unable to understand them.

"I wish they would just send the messages in English, because at least that we have some knowledge of."
– Migrant, Musina

49 Alexander, M. (22 October 2023). "The 11 languages of South Africa". South Africa Gateway.

Action

This section explores findings related to the ability of marginalised communities to take preventative action upon receiving risk communication.

The degree to which marginalised communities take action is determined by several intersecting factors, including access to financial resources, location and awareness of risk.

Many participants we spoke with felt they do not have the financial resources to take action in an emergency situation, regardless of whether they receive weather warnings in advance. Actions they felt were beyond their reach included purchasing materials in advance to reinforce their housing structures, paying for transport to safer locations or finding alternative living spaces should they want to leave their house. Likewise, many were hesitant to risk leaving behind their limited possessions that they had worked hard to accumulate over time. This created a sense of hopelessness when speaking about potential action.

To complicate matters, those with the least financial resources often live in communal shelters and informal housing, which are highly susceptible to damage and crime. In some cases, residents may not even be permitted to reinforce their housing structure even if they have the resources. For example, undocumented migrants (who often have very limited financial resources) staying in communal shelters noted that wind is one of the biggest weather challenges they face. They reported that they neither have the materials nor are they allowed to batten down the shelter as the municipality requires a clear view into the facility. Opportunistic crime is also higher in urban informal settlements due to the dense population. Criminals in the area will use the opportunity provided by emergencies to go into empty households and steal items of value. The residents of informal settlements we spoke with reported being more hesitant to leave their houses and belongings during an emergency.

As previously mentioned, marginalised communities reported relying on nearby community members and leaders to receive and verify information. They also rely on neighbours and relatives with homes on higher ground for safety in times of flooding. Thus, **a lack of strong local social support networks can be a barrier to action**, as seen in transient populations such as migrants, or those displaced from a recent disaster, who may have weaker community networks.

Older people are particularly reliant on neighbours and relatives to help them take action in dangerous weather events. Preparation before extreme weather and during evacuation requires assistance from others as they are less mobile and physically able to make adjustments to their housing structure.

"We are on our own. We can't think of moving. Some people just cry and wait."
– Elderly person, East London

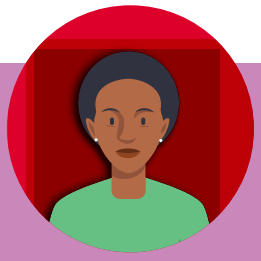
Finally, **lack of relevant and localised risk knowledge can hinder people from taking preventative action**. Many participants reported tolerating some damage to their housing, such as small amounts of water leakage or losing parts of their roofs or walls, to avoid the cost and effort of taking action in advance. Without reliable knowledge of severe risk (i.e. to life or property loss), action is less likely to be taken.

However, there is a fine line between storms that cause minor flooding and damage and those that require more drastic action. In South Africa, weather events can happen rapidly and change quickly, making it difficult to differentiate between "bad" and "most severe" events ahead of time. This is compounded by low weather literacy, particularly about the severity and likelihood of weather events, and the localised nature of the impacts – certain neighbourhoods, houses or areas of town are more susceptible to damage than others.

Most weather information is shared from a national, rather than regional or local, perspective. This leaves people unsure whether information is relevant to them and therefore less likely to act upon it. Across all research groups and locations, participants noted that **more geographically-specific weather warnings that highlight higher-risk areas would more likely lead to action**. Similarly, people want more detailed information to guide them on what actions to take when an event is happening. When the project team questioned participants about how action-oriented information could be improved, participants noted that they wanted messaging to be more prescriptive.

"Tell us where to go, what to do, when the storm will hit, and how severe the damage is going to be. It's not easy for us to know whether the weather will be more than your everyday storm."
– Woman, Durban

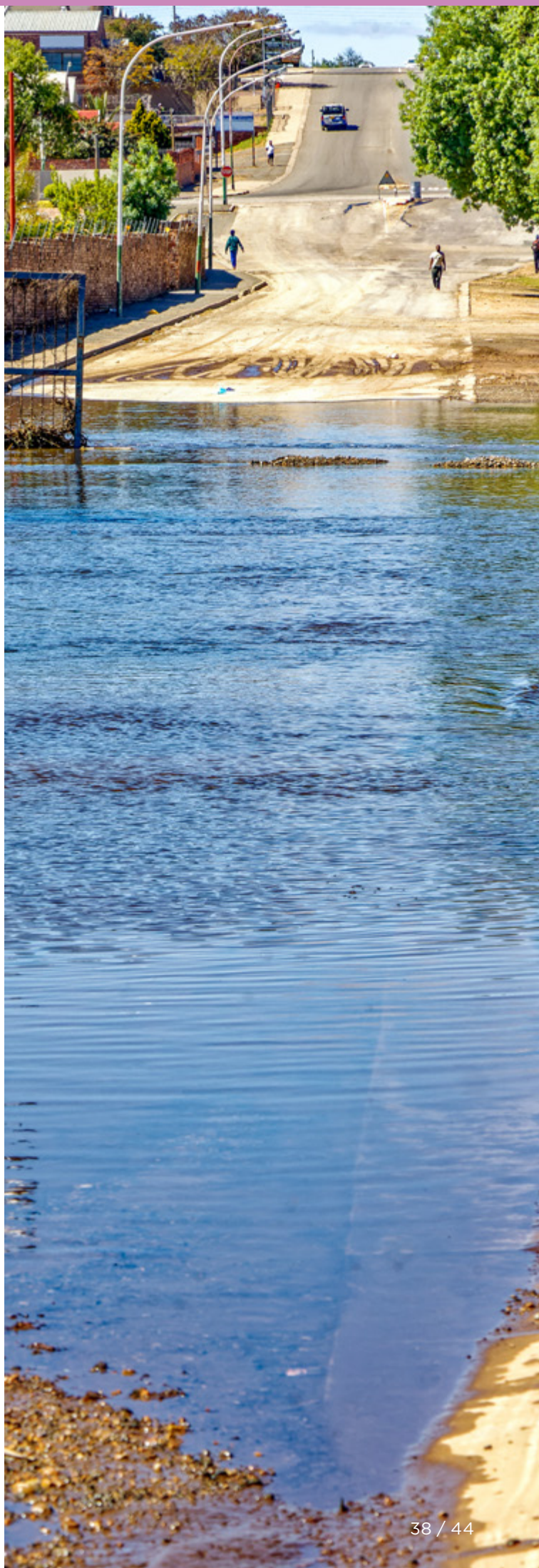
Those recently affected by a disaster have lower risk tolerance and are more motivated to take preventative actions than other groups. Having experienced the consequences of such events directly, these respondents particularly sought preparedness information to mitigate future risks.



Nolwazi:
Post-disaster person

Nolwazi was relocated to a two-room shack on a farm outside Tongaat. She was unable to keep her job due to the increased travel distance and is finding it hard to pick up piecemeal jobs without knowing people in her new community. With little to no income, it will take a long time to rebuild her housing structure, and the actions she can take in the event of future hazardous weather are extremely limited. Having lived through a severe weather event, Nowalzi has a high risk perception and would like information on how to take precautionary measures, where possible.

"Now when it rains I am worried that those floods will return."
– Woman, Durban



08

Recommendations

This section offers recommendations for designing risk communication strategies that are more inclusive of marginalised communities and enhance awareness, trust, understanding and action.

These recommendations often reinforce well-recognised global best practices. However, it is important to note that these recommendations are based on research conducted within specific regions of South Africa with a limited sample size and may not be universally applicable. Adapting risk communication strategies to align with the distinct needs and conditions of each community is crucial to successful implementation in different global contexts.

While risk communications should be multi-directional, these recommendations focus on the top-down flow of information from stakeholders engaged in risk communication and EWS to communities.

These stakeholders include:

- **Government institutions,** such as national, provincial and municipal bodies, national meteorological services and institutions responsible for disaster management and communications
- **Non-governmental organisations (NGOs)** and other public and private organisations that play an auxiliary role in disaster risk management and community outreach
- **MNOs** engaged in risk communication strategies

Communication methods

Use multiple communication channels: Since marginalised groups, both in South Africa and globally, often have more limited access to technology, consider using both digital and analogue channels. Avoid relying solely on digital devices, particularly smartphones. Participants also reported that seeing the same information on multiple channels enhanced their trust in the information and their ability to verify it.

Use TV and radio: While access to TV and radio may be limited among marginalised groups, these channels are widely trusted and remain crucial for reaching wider audiences, particularly in less digitally connected regions.

Use mobile channels: Despite the barriers, mobile channels can still be an effective tool to introduce information to a community that can then be disseminated by digitally connected members to those less digitally connected or literate. Before designing an EWS, conduct research to understand trusted channels, especially among marginalised groups. In South Africa, for example, it is recommended to avoid using bulk SMS and automated phone calls as primary methods of communication, as these are often distrusted due to their association with scams. Among the communities we spoke with, official WhatsApp broadcast channels and outbound toll-free hotlines stood out as more trusted channels.

Build on existing, trusted digital channels: Consider using apps that people already use to access daily information. For example, in South Africa, sources for load-shedding schedules, payment platforms, social media or communication apps like MoyaApp could all be used to disseminate risk information.

Leverage community practices: Consider using community communication practices based on word of mouth. In communities where access to technology is limited, traditional methods in South Africa like community gatherings and "loudhailers"[50] can be effective for spreading messages.

Channel information through trusted community groups and community leaders: It is beneficial to channel information through respected and trusted groups like SARCS and networks of community leaders, as these types of groups and individuals can convey critical information to their networks effectively.

Content development

Highlight cost-free actions: Consider providing clear, short and concise instructions on immediate, cost-free and accessible actions people can take to protect themselves and their property, which are relevant for rapid onset events and residents with the lowest socio-economic status.

Craft shareable digital messages: Think about crafting digital messaging that can be shared easily with non-digital community members. This may include voice notes that can replay credible warning information and graphics that can be shown to those who do not own mobile phones. Add a call to action at the end of each message to highlight the importance of sharing weather warnings with those who do not have access to digital channels.

Combine visual formats: Where possible, use both written instructions and symbols to communicate risk. This approach helps accommodate varying literacy levels and understanding of symbols. In the communities we spoke with, weather severity was commonly misinterpreted. Communicating weather information through colour, imagery and tone of voice can create more urgency than technical and text-heavy information. Including suggestions for practical actions that correspond to the severity of the pending event can help users see the benefits of action and better understand their options.

Co-design content with community input: Think about involving the community in the design of content or provide training on their meanings to ensure that content, including symbols are understood. For example, participants in this research showed significantly increased understanding of symbols that depicted the impact of hazards, like a house surrounded by water to indicate flooding.

Incorporate voice notes: Consider using voice notes to communicate with communities, especially those with minority language speakers or low literacy levels. Platforms like WhatsApp can be particularly effective for this purpose. Voice notes can also convey the degree of urgency through tone and can be played aloud to those without access to mobile technology.

Distinguish risk and preparedness information from emergency warnings: Aim to maintain the urgency of emergency alerts by clearly distinguishing between general risk information and emergency warnings.

Localise content

Share hyperlocal information: Weather impacts can vary significantly even among nearby households. The disparity between broad weather forecasts and local realities often leads people to ignore warnings that do not seem applicable to their circumstances. To share hyperlocal information and provide more targeted risk communications, local partners and community leaders can pinpoint high-risk areas for weather damage. Messages could compare expected weather impacts with known high-risk zones to convey potential severity. For example, if heavy rains are predicted, alerts could specify flooding beyond typical levels in flood-prone areas. Particular technologies may also help to facilitate more geographically targeted alerts. For example, CB technology can provide alerts to narrow geographic areas,[51] ensuring that recipients only receive relevant messages and increasing the likelihood of timely and appropriate action.

Include locally relevant languages: Where possible, ensure that communications are in languages that cater to those speaking local dialects and to foreign

50 Loudhailers are portable loudspeakers with a built-in microphone and amplifier, commonly used in South African communities for disseminating announcements related to community events, political announcements, public gatherings or emergency situations. Loudhailers were perceived by participants as an effective method for reaching everyone. However, they are not currently used for weather-related updates.

51 Parsons, O. and Hamilton, Z. (2023). Cell Broadcast for Early Warning Systems: A review of the technology and how to implement it. GSMA.

nationals. This may mean extending messaging beyond official national languages. To identify relevant languages, local organisations could be asked to share their data on community language use, communication preferences and who cannot access services.[52]

Explore and invest in language technology solutions: Investigate emerging language technologies that can help break down barriers in risk communication and consider funding research for real-life use cases in the humanitarian field.[53] Continue to invest in the development of these technologies to enhance accessibility and inclusion in the dissemination of critical information.

Source credibility

Identify official sources clearly: Try to ensure that information from official sources like SAWS is clearly marked and identifiable. Using official logos or explicit identifiers can help reinforce the credibility of the information.

Establish a consistent brand: Maintain a distinctive visual identity by incorporating recognisable audio cues, using a consistent tone and including the same logo.

Ensure consistency across channels: Where possible, share the same information in a consistent format across all communication channels, which helps to reinforce the message and build trust.

Community engagement

Identify and co-develop with marginalised groups: Special attention should be given to groups without strong community networks or those not included in official databases, such as migrants. Consider working with community leaders to identify marginalised groups. Engage with both leaders and community groups to build trust, understand their communication needs and preferences and integrate these into risk communication strategies and emergency preparedness mechanisms.

Raise community awareness of official risk communication channels: Consider raising awareness of official channels dedicated to risk communications and emergency warnings. Strive to educate the community on how to access and use these channels effectively and stay informed during a crisis.

Engage youth as digital connectors: Since youth are typically more engaged with mobile technology and connected to smartphones and social media, they can play a pivotal role in spreading information rapidly and acting as a gateway to knowledge within their communities. Consider training young, trusted and digitally-skilled community members (chiefs, school principals, volunteers, etc.) to share accurate risk information with those lacking digital access, such as older people. This can be done through phone calls, text messaging or direct interaction.

Develop weather literacy and hazard training: Consider developing programmes to increase weather literacy and understanding of weather hazards. Disaster risk reduction education could be offered to better prepare those who are most at risk (i.e. those who live in locations near rivers, valleys, floodplains or those facing greater barriers, such as older people).

52 Kemp, E. (2024). Language and Digital Humanitarian Action: The state of inclusion and exclusion for marginalised language speakers in digital humanitarian services. GSMA.

53 Ibid.

Communities in Haiti access new technologies for early warning/response (CHANTER)

Funded by the GSMA Innovation Fund, Mercy Corps' CHANTER initiative, in partnership with Viamo in Haiti, highlights the value of targeted weather literacy and preparedness programmes. It demonstrates that using mobile technology to engage and educate communities about weather hazards can markedly improve their resilience and response to emergencies.[54]

The CHANTER platform is designed to deliver a 12-week curriculum on extreme weather preparedness and first response practices, as well as early warning messages. It leverages SMS and interactive voice response (IVR) technology through Viamo's mobile communication platform and via Digicel's Haitian mobile network. The messages are tailored based on recipients' livelihood activities and locations to ensure they receive useful information.

The project aimed to support communities by limiting loss of income, better protecting households and reducing the risk of physical harm in the wake of more frequent, sudden onset disasters in Haiti.

Under the CHANTER programme, more than 11,000 individuals in Haiti received messages that successfully influenced them to change their behaviours and take proactive measures to mitigate the impact of potential natural disasters. A significant 84% of those surveyed took actions based on CHANTER's suggestions, gaining skills in emergency preparedness, resource management and community response planning. The initiative also facilitated information-sharing within communities, with recipients spreading vital knowledge to others not directly subscribed to the service.[55]

Establish ongoing risk communication and feedback mechanisms: Try to maintain regular communication with communities to keep them informed about potential risks and ongoing situations. Establish feedback loops that allow communities to express their needs and experiences. Where possible, engage particularly with marginalised communities. This feedback can be used to improve understanding, continuously refine communication strategies and ensure they remain relevant by incorporating local knowledge. Continuous dialogue and iteration of the strategy builds trust, improves understanding and increases the likelihood of an effective response.

54 GSMA. (2020). "Communities in Haiti Access New Technologies for Early Warning/Response (CHANTER): Grant Project Outcomes and Lessons".
55 Ibid.

Conclusion

As mobile and smartphone penetration continues to expand, digital channels for risk communciations will become a more important part of a multi-channel approach. The evolving capabilities of mobile technology, such as increased granularity in geotargeting, are improving the effectiveness of mobile phones for the dissemination of early warnings.

Despite the ubiquitous nature of mobile technology and its potential to improve risk communications, significant barriers remain, particularly for marginalised groups that already face systemic challenges in accessing reliable communications and actionable information through digital channels. These challenges are compounded by persistent socio-economic and geographical disparities in South Africa, illustrating the need for targeted approaches that address the specific needs of marginalised populations. The recommendations of this report aim to address these challenges.

The findings of this research emphasise the importance of multichannel communication strategies that integrate both digital and analogue methods to reach a broad audience with inclusive and accessible information. Mobile and digital channels still have a key role to play in reaching communities at a local level with vital weather information even though many participants in marginalised communities often access this information second hand through interpersonal networks. The engagement of marginalised communities in the design and implementation of risk communication strategies is therefore crucial.

While the findings are often specific to certain groups, individuals from other contexts may face similar obstacles due to factors such as geographical location or lack of community ties. When designing risk communication strategies, it is therefore important to identify characterisations of marginalisation rather than particular demographics such as age, gender or migration status to identify those at risk of exclusion. By involving at-risk communities from the onset and at every step, from planning to executing risk communication over time, risk communications will not only be inclusive, but also prompt necessary actions to safeguard lives and property.

Stakeholders have a shared responsibility to ensure inclusion is designed into risk communication strategies and considers both the value and limitations of digital channels.

For **government and top-level agencies**, digital channels should remain a complementary part of a robust multichannel strategy built around a strong national EWS brand. Together with simplified warning language, imagery and calls to action, these stakeholders can help bridge the divide between technical expertise and at-risk, marginalised community members.

For **supportive risk communication players in the private and public sectors, like SARCS**, helping to localise emergency preparedness and warnings can be a significant contribution. This begins with educating communities about appropriate actions to take in advance and continues with identifying ways to integrate risk communications in local practices, filter digital information to those who are less connected and reach target populations who are most at risk. They can also conduct advocacy with government and top-level agencies to ensure the voices of communities at risk are included in government efforts.

MNOs can play an important role in helping these stakeholders tap into the benefits of mobile technologies. By leveraging capabilities like CB, early warnings can become more local and urgent. Parallel initiatives aimed at bridging the digital divide, which may include expanding network coverage and promoting low-cost device ownership, can also help to create more impactful risk communication.

This research underscores the need to identify the barriers faced by marginalised communities in any context and design risk communication strategies that include all segments of society. Only by addressing these unique challenges can the life-saving power of risk communications and the goal of EW4All be fully realised.

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