Disaster Risk Reduction and Management:
Digital Technologies to the rescue?

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Using Digital Tech for Emergency Preparedness: Five case studies

1. **Extending cellular coverage**
   - Examples from Tanzania and Niger
2. **Mobile money for resilience**
   - Examples from Somalia and South Sudan
3. **Automated weather stations networks**
   - Proposed Pan-African network
4. **Using mobile signal attenuation for flood warnings**
   - Examples from Mali and Burkina Faso
5. **Early Warning Systems in Action**
   - Examples from Somalia

1. Extending cellular coverage

The problem

Globally, around 400 million people lack access to cellular signal, and more than 4 billion live outside of range of mobile broadband (3G/4G)

Relationship to emergency preparedness

Cell service offers the ability to make and receive phone calls and texts, which is a basic emergency response. Alternatives to cellular (VHF, Satellite) are generally expensive

Proposed response

Using a mix of Universal Service Funds and Development Partner funding to facilitate private sector expansion of cell networks, combined with solar power, through PPPs

Intervention mechanisms

In Tanzania (under RCIP) and Niger (under Smart Villages program), the WBG is using reverse auction subsidy mechanisms to stimulate mobile operator CAPEX investment.
In Tanzania, GSMA used infra sharing and national roaming as a solution

1. Extending cellular coverage in Tanzania and Niger

Tanzania

- Under RCIP program, an additional 2.5m people benefitted from cellular service for first time.
- US$30m from IDA and USCAF mobilised US$70m from private sector
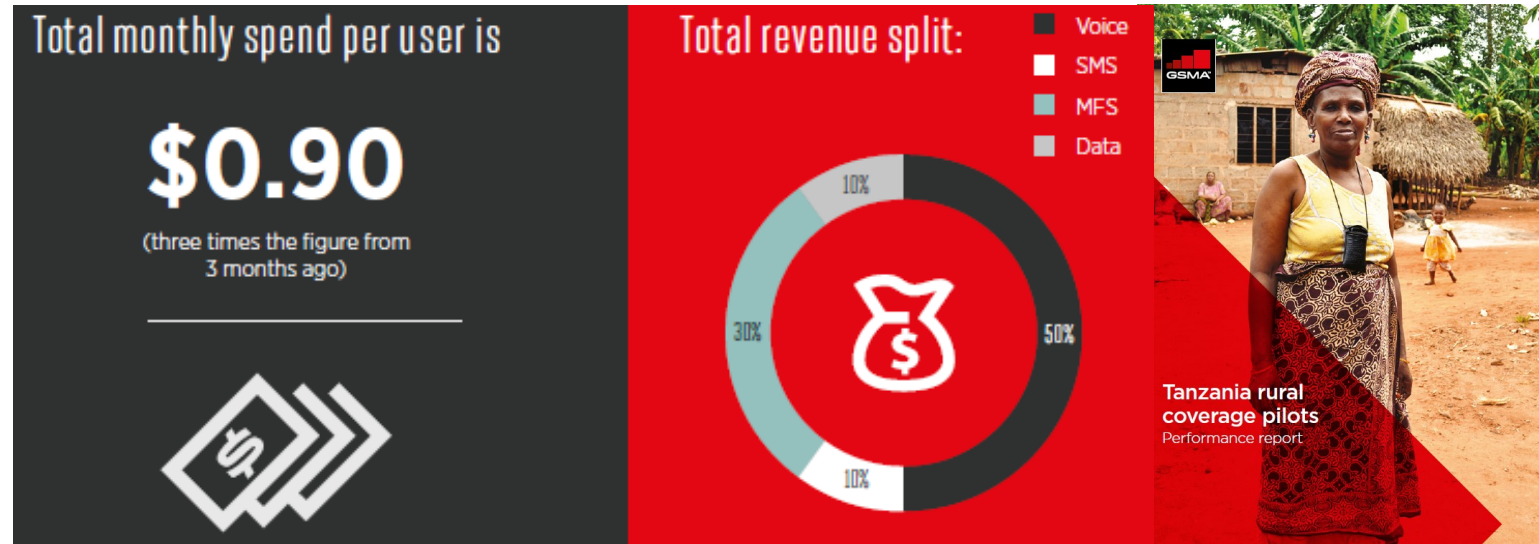- Competitive reverse auctions used for allocation

Niger

- Smart Villages program will see model extended to 700 villages

GSMA Rural Coverage Pilots

- Used national roaming and infra sharing in 6 villages
- Voice provides 50% of revenue and mobile money 30%

Total monthly spend per user is

$0.90

(three times the figure from 3 months ago)

Total revenue split:

- Voice
- SMS
- MFS
- Data

10%

30%

50%

10%

Tanzania rural coverage pilots
Performance report

2. Using Mobile Money for Resilience

The problem

Low income communities, in fragile zones (esp nomads) face increased risks from climate change, notably drought and floods

Relationship to emergency preparedness

Fragility is characterised by low savings and limited resilience to environmental shocks. Building resilience needs new forms of saving and ability to receive funds from outside

Proposed response

Mobile money offers an alternative to cash-based payments, especially where there is little confidence in local currency. Humantarian payments can be disbursed quickly.

Intervention mechanisms

In Somalia, Multi-Partner Fund is conducting research on mobile money usage in vulnerable communities and helping Government and Humanitarian organisations (Concern) use mobile money for cash-based payment. Now extended to South Sudan

2. Using Mobile Money for Resilience in Somalia

22% of users mentioned that **mobile money helps reduce their vulnerability to crises** by helping them receive money in case of shocks, and save money for emergency preparedness.
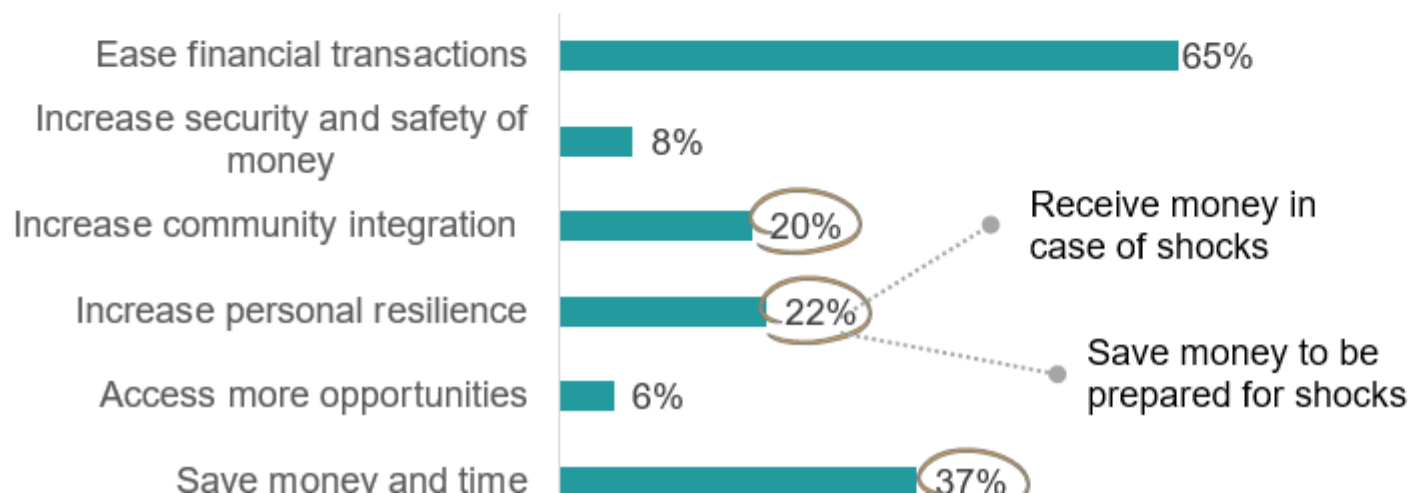
37% of users mentioned that **access to mobile money services helped them save time and money**. Reducing the opportunity cost of travelling somewhere to make a transaction could, in turn, enable mobile money users to invest more time in productive activities, while also leaving more money for vulnerable populations due to the absence of logistical costs.

Another indirect benefit with a potentially positive impact on resilience is that mobile money **helps people stay more connected with relatives and friends:**

20% of users mentioned that **mobile money helps them stay more connected** by facilitating transfers to support family or community needs.

Perceived benefits of mobile money: What do you see as important benefits that you gain from using mobile money?
Sample of those who use mobile money N=988

Ease financial transactions — 65%
Increase security and safety of money — 8%
Increase community integration — 20% → Receive money in case of shocks
Increase personal resilience — 22% → Save money to be prepared for shocks
Access more opportunities — 6%
Save money and time — 37%

> " I am better connected to my family thanks to mobile money. For example, my son moved with our camels to a far away place and I normally inquire about him and send him money through mobile money. "
>
> *Male nomad, Somaliland*

3. Africa-wide meteorological data collection

The problem

    Hydrological and meterological data collection in Africa is generally underfunded, uncoordinated and relies too heavily on manual inputs

Relationship to emergency preparedness

    Timely and accurate HydroMet data can help organisations prepare for emergencies and broadcast timely warnings
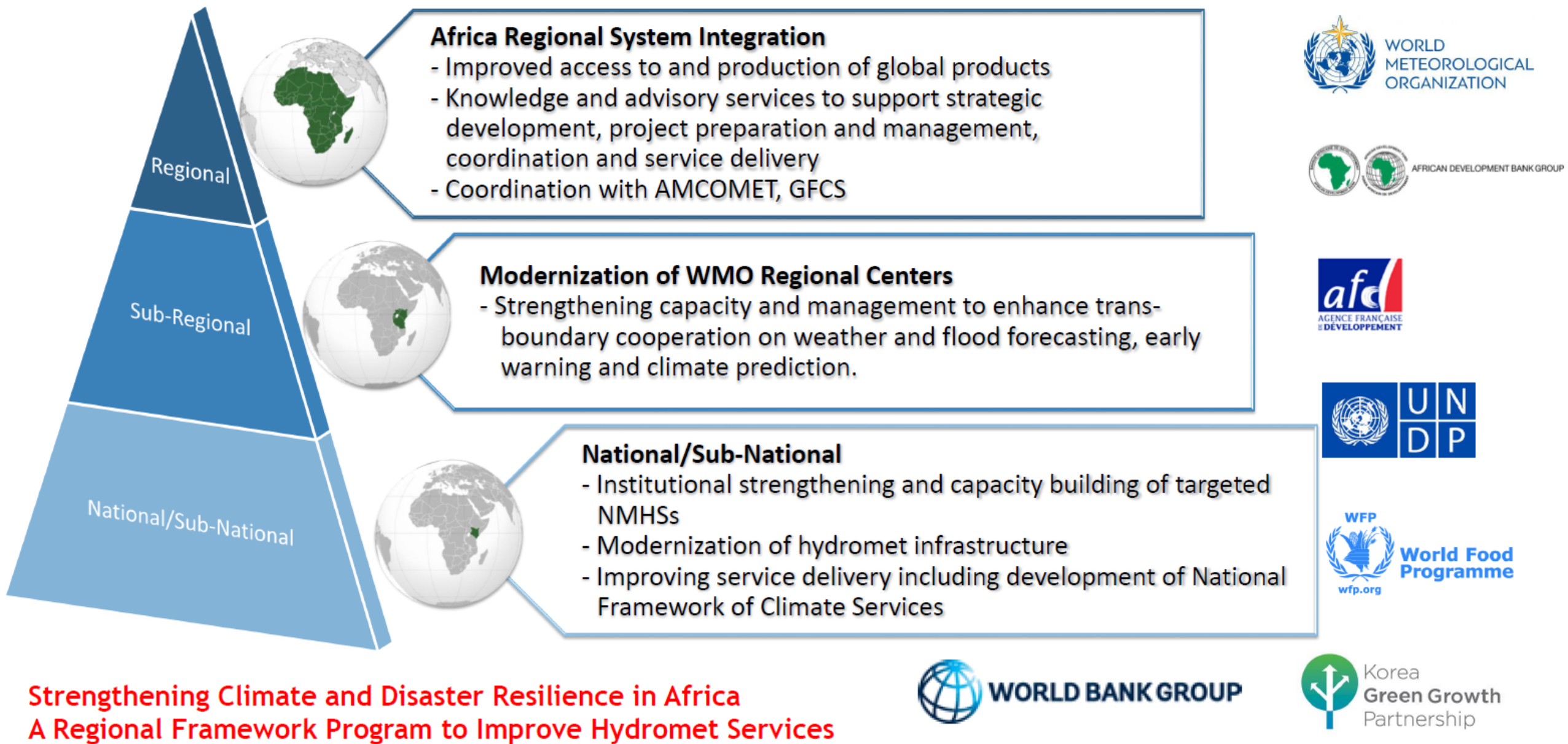
Proposed response

    Partnership of development agencies, technical partners and national agencies to join forces for improved collection and reporting of Hydromet data

Intervention mechanisms

    Regional and national coordination through appropriate organisations. Modernization of WMO regional centers and use of automated weather stations requiring minimal intervention.

3. Africa Hydromet program and partnership

Regional

Africa Regional System Integration
- Improved access to and production of global products
- Knowledge and advisory services to support strategic development, project preparation and management, coordination and service delivery
- Coordination with AMCOMET, GFCS

Sub-Regional

Modernization of WMO Regional Centers
- Strengthening capacity and management to enhance trans-boundary cooperation on weather and flood forecasting, early warning and climate prediction.

National/Sub-National

National/Sub-National
- Institutional strengthening and capacity building of targeted NMHSs
- Modernization of hydromet infrastructure
- Improving service delivery including development of National Framework of Climate Services

WORLD METEOROLOGICAL ORGANIZATION

AFRICAN DEVELOPMENT BANK GROUP

afd AGENCE FRANÇAISE DE DÉVELOPPEMENT

UNDP

WFP World Food Programme wfp.org

**Strengthening Climate and Disaster Resilience in Africa
A Regional Framework Program to Improve Hydromet Services**

WORLD BANK GROUP

Korea Green Growth Partnership

4. Using mobile signal attenuation data for flood forecasting

The problem

> With increased Global Warming and Climate Change, incidence of extreme weather events, notably flash floods, are likely to increase

Relationship to emergency preparedness

> Conventional flood forecasting techniques fail to provide real time data with sufficient lead time to broadcast alerts through early warning systems

Proposed response

> Use real-time data from mobile signal attenuation, which is geo-tagged by cell tower location, to provide early warning, backed up by Big Data analysis of patterns

Intervention mechanisms

> In Mali (Bamako) mobile network operators (Orange, SotelMa and Malitel) are working with Mali Meteo to povide flood warnings based on real-time data from cell towers. Also used in Burkina Faso and planned for extension to Niger.

4. Bamako RainCell application for flood warnings

- Tel Com operators use radio link for some of their network (backaul) – Antenna to Antenna

- Rainfall attenuates the microwave energy between these antennas

- If we have access to these fluctuations : we can measure rainfall

Émetteur / Récépteur
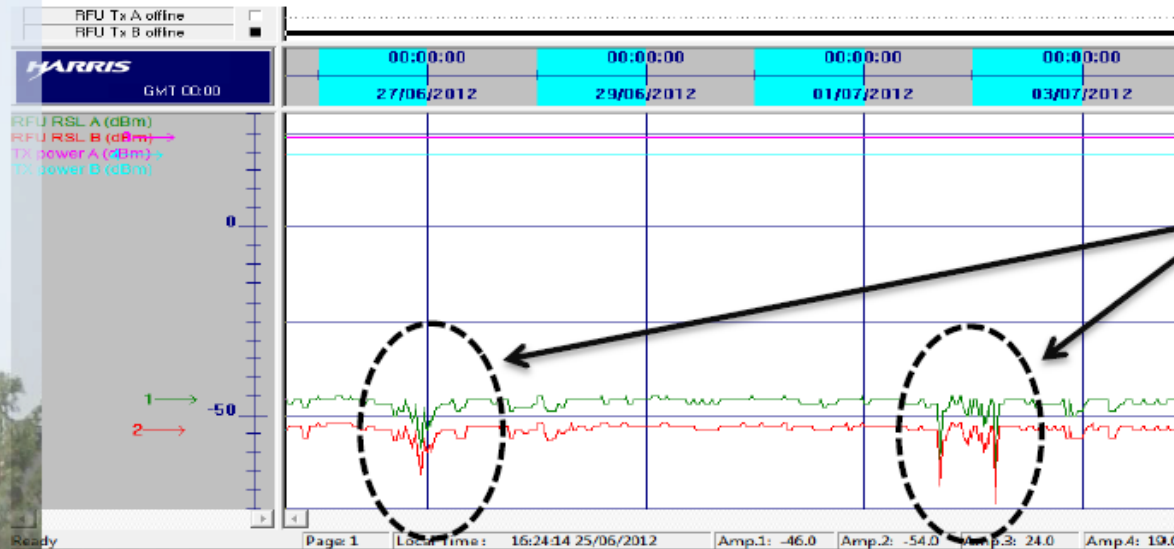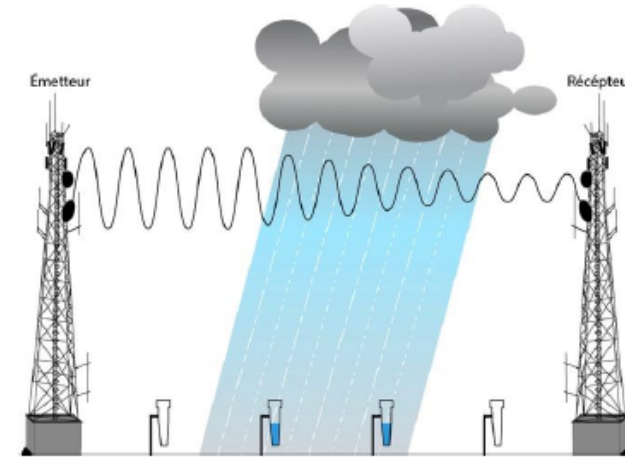
Typical signature of a storm on the telecom network quality monitoring data.

Courtesy Télécel Faso

5. Using digital technologies for Early Warning Systems

The problem
   Early Warning Systems in conflict zones, such as Somalia, lack mechanisms for broadcast and dissemination

Relationship to emergency preparedness
   Early Warning systems are conventional system for issues of food security, exteme weather events, drought, conflict etc.

Proposed response
   Use mobile phones more extensively for dissemination of alerts, using SMS, social media messaging and interactive voice response

Intervention mechanisms
   In Somalia, WBG and Multi-Partner Fund worked with Altai to conduct a Household Survey of mobile money usage among vulneable communities, and conducted focus groups with development partners to better understand potential

5. Existing Early Warning Systems in Somalia

Area	Coverage	Use of mobile phones	Challenges
Food security	Parts of the country not covered by surveys	No	Mostly uses secondary data (few surveys)
Drought	Parts of the country not covered by surveys	No	Mostly uses secondary data (satellite-based)
Floods	Lack of automatic weather stations in the South	To collect data and disseminate information	Funding
Health	Questionable comprehensiveness	No	Only captures diseases reported in health facilities
Conflict	Focus on cross-border areas	No	Funding

- Existing EWS **mainly rely on secondary data and are not systematically using real-time data.**
- They **do not always cover the whole territory.**
- They **do not lead to systematic alerts** of humanitarian stakeholders and people at risk, and **do not involve community members**, as even the SWALIM system relies on a specific number of trained field observers.
- **The only EWS in Somalia currently making use of mobile phone technologies is the SWALIM system** which allows to gather rainfall data and to disseminate warnings about risks of flooding to communities.
- Somalia is covered by two EWS for **drought/food security** (FEWSNET and FSNAU), but they rely mostly on **indirect data** such as remote sensing. FSNAU does collect its own data through surveys but parts of South Central Somalia are not covered. Nutrition surveys seem to be conducted only twice a year, for example, which could be insufficient for a real-time EWS.
- In terms of **conflict EWS**, Somalia is only covered by the regional CEWARN (IGAD), which focuses on cross-border areas and faces **funding challenges.**

5. What could be done to improve Early Warning Systems in Somalia

Recommendation 1. The focus of future EW efforts should be on providing organizations already involved in EWS with timely and representative data. EWS have already been set up by various organizations (FAO, IGAD, etc.) in the areas of nutrition, drought, floods, health and conflict, but these organizations often lack real-time and representative data. For instance, an independent integrated EWS could be setup to provide these organizations with more complete, multidimensional, representative, and real-time data.

Recommendation 2. Mobile-phone technologies could be taken advantage of to setup community-based EWS to collect data and disseminate warnings, given a) the high level of mobile-phone ownership in Somalia, and b) the ability of mobile technologies to geographically target populations (based on experience from the Somali Emergency Phone Survey, funded by the World Bank and implemented by Altai Consulting, which showed that Mobile Network Operators are able to associate phone numbers with pre-war regions and districts).

Recommendation 3. A crowdseeding system may be preferable to a crowdsourcing one to collect data. Indeed, the literacy rate is relatively low - a bit more than half of the population is literate as evidenced by the World Bank-funded Somali High Frequency Survey (SHFS), and the isolation of some parts of the population (pastoralists, areas under Al Shabaab's control) makes it unlikely that a crowdsourcing system would be known by all categories and result in representative information. For instance, based on a crowdsourcing system, Africa's Voices Foundation asked radio listeners to answer questions by SMS and found that *"86.4% of respondents are 15-29 years old compared to 53.7% in population, 44% are women compared to 49.3% in the population"*[1], therefore resulting in a biased sample.

Recommendation 4. As only 30% of the Somali population has a smartphone (finding from MME) and internet coverage can be limited to urban areas, an SMS-based system such as FrontlineSMS could be more appropriate, and more cost- and time-efficient than an internet/smartphone-based reporting system.

Recommendation 5. Mitigation measures, such as financial incentives for selected informants, would need to be factored into the system to minimize attrition rates. Indeed, previous SMS surveys implemented in Somalia exhibited important attrition rates (e.g. very few answers were received by SMS, and nomads had to be called, sometimes repeatedly - up to 7 attempts, for the SMS follow-up survey implemented by Altai Consulting with nomads as part of the second wave of the SHFS survey).

Source: WBG (2019) Mobile Money household survey of Somalia, Phase 2

[1] "Two-way radio Using radio and mobile phones to engage with Somali women and youth", Africa's Voices Foundation for UNICEF Somalia March 2016

Thank You

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