The Climate Crisis:
Mobile-enabled solutions in humanitarian emergencies

November 2021

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01. Introduction

Climate change is one of the main drivers of humanitarian need and human suffering. Over the past decade, 83 per cent of disasters triggered by natural hazards were due to extreme weather and climate-related events.[1] People living in fragile circumstances suffer the most severe effects. For example, communities affected by conflict are disproportionately impacted by climate change as it intensifies humanitarian needs, increases displacement, disrupts food production and weakens health care systems.[2] One of the greatest inequalities of the climate crisis is that the countries and individuals least responsible for greenhouse gas emissions will be most affected by the consequences.

The latest Intergovernmental Panel on Climate Change (IPCC) findings, released in August 2021, are concerning for the world, but even more so for the humanitarian community.[3] They confirm that even under the best-case scenario, a humanitarian system under enormous strain will be forced to cope with a growing number of climate-related hazards.[4] The World Bank estimates that climate change could push more than 130 million more people into poverty by 2030.[5] Innovative solutions are therefore urgently needed in a humanitarian system already stretched to its limits.

As the frequency and intensity of climate-related hazards has increased, so too has the prevalence of mobile technology. Today, roughly two-thirds of the global population, or 5.2 billion people, have a mobile connection.[6] In an increasingly networked world, the power of mobile technology can be harnessed to address the impacts of a changing climate and reach those most at risk.

Digital and mobile-enabled services have a key role to play in addressing the climate crisis. Not only can they help vulnerable communities prepare for and become more resilient to climate risks, but they can also support humanitarian organisations to deliver aid more efficiently and anticipate their response.

The GSMA Mobile for Humanitarian (M4H) Innovation programme has been supporting several mobile-enabled initiatives that focus on climate mitigation and resilience. These innovative projects are having an impact on communities affected by and at-risk of climate-related hazards, and they are providing essential insights into the unique role of mobile technology.

Divided into two overarching sections (mitigation and resilience), this report outlines five use cases in which mobile technology plays a critical role in addressing the climate challenge in humanitarian contexts. It also provides seven case studies from across the M4H portfolio to showcase innovations in practice.

1 IFRC. (17 November 2020). World Disasters Report 2020: Come Heat or High Water – Tackling the Humanitarian Impacts of the Climate Crisis Together.
2 ICRC. (9 July 2020). "ICRC report: Climate change and conflict are a cruel combo that stalk the world's most vulnerable". News Release.
3 Suarez, P. et al. (9 August 2021). The Physical Science of Climate Change: Seven key humanitarian insights from the latest IPCC report. IFRC Climate Centre.
4 Igoe, M. (10 August 2021). "How climate change will reshape development". Devex Newswire.
5 Arga Jafino, B. et al. (September 2020). Revised Estimates of the Impact of Climate Change on Extreme Poverty by 2030. Policy Research Working Paper 9417. World Bank Group.
6 GSMA. (2020). The Mobile Economy.

1.1 Climate change as a driver of humanitarian need

The impacts of climate change are exacerbating global inequality and inequality within societies. Countries at the bottom of human development indices are falling even further behind and requiring more humanitarian assistance from a system that is already stretched to its limits.

In 2020, 12 of the 20 countries most vulnerable to the effects of climate change (Haiti, Yemen, Burundi, Mali, Zimbabwe, Niger, Sudan, Afghanistan, Democratic Republic of the Congo, Central African Republic, Somalia and Chad) launched an interagency humanitarian appeal.[7] Collectively, these 12 countries experienced 27 climate-related disasters in 2020, ranging from acute droughts to tropical cyclones and flash floods. These disasters were magnified by other chronic climate-related issues, such as water scarcity in Yemen and a locust invasion in Somalia. Concurrent and consecutive disasters are leaving communities with little time to recover before the next shock arrives.[8]

In this decade alone, climate-related hazards are expected to increase the number of people in need of humanitarian assistance by half.[9] Yet, funding for climate change adaptation and disaster risk reduction does not consistently prioritise countries that are most at risk and least able to adapt and cope with these risks.[10]

Box 1

Climate-related hazards, exposure and impact

In this report, the term "climate-related hazard" encompasses all extreme weather and climate events, both slow-onset and sudden-onset events (see the Glossary for a more detailed definition).

The extent of the impact or risk of a climate-related hazard depends on the exposure and vulnerability of natural and human systems. This is an important concept from a humanitarian standpoint since humanitarian organisations have a critical role to play in reducing the vulnerability and exposure of affected populations to climate-related hazards.

7 Under-Secretary-General for Humanitarian Affairs, Mark Lowcock. (19 April 2021). ODI Humanitarian Policy Group/Institute for Security Studies webinar, "The climate crisis and humanitarian need: taking action to support the world's most vulnerable communities".
8 IFRC. (17 November 2020). World Disasters Report 2020: Come Heat or High Water – Tackling the Humanitarian Impacts of the Climate Crisis Together.
9 ICRC (6 February 2020). The future is now: time to scale up climate mitigation and adaptation measures.
10 Ibid.

The connection between climate and conflict, food insecurity and displacement

Climate change intensifies humanitarian challenges in complex and interconnected ways that can also increase displacement, food insecurity and conflict.

Climate and displacement

Since the 1970s, disaster displacement has quadrupled. The rate of displacement is expected to rise sharply[11] as climate-related hazards become more frequent and intense, from droughts and heatwaves to flooding, winter storms, hurricanes and wildfires.[12] Most refugees and internally displaced persons (IDPs) come from and still live in climate hotspots. According to the Internal Displacement Monitoring Centre (IDMC), in 2020, three in four cases of internal displacement could be attributed to weather-related events,[13] and people in low- and lower-income countries are at least four times more likely to be displaced by climate-related hazards than people in high-income countries.[14]

According to the International Federation of Red Cross and Red Crescent Societies (IFRC), in the six-month period between September 2020 to February 2021, 12.5 million people were displaced globally.[15] Sixty per cent of displacements occurred in the Asia Pacific region where most people were displaced due to climate and weather-related disasters.[16,17] Approximately 2.3 million people were displaced by conflict in the same period, indicating the vast majority of internal displacements are now triggered by climate change.[18] The future is even more concerning – estimates from the World Bank suggest that up to 90 million people may be displaced during this century by sea level rise alone.[19]

One of the primary causes of displacement is flooding, with the risk of people being forced from their homes increasing by half for every additional degree of global warming.[20] Southeast Asia has been hit particularly hard, with floods and typhoons devastating parts of Vietnam, Bangladesh, the Philippines, Cambodia and Thailand.

Displaced persons have critical basic assistance and protection needs, including shelter, access to clean water and sanitation, health and psychosocial support, protection from violence (including gender-based violence and child protection) and longer-term support to recover and find durable solutions.[21] The COVID-19 pandemic has made humanitarian operations more complex than ever, and exacerbated the acute vulnerabilities of marginalised groups who have been displaced.[22]

Climate and food insecurity

Climate change and climate-related hazards are behind the recent rise in global hunger, malnutrition and food insecurity[23] – a direct consequence of the destruction of land, livestock, crops, assets and food supplies.[24] The agriculture sector has endured the greatest losses, and this damage has long-lasting and multi-pronged impacts on a country's economy. For example, regional droughts and heatwaves have reduced crop harvests by 20 to 50 per cent in recent years.[25]

Smallholder farmers often lose standing crops as well as assets, affecting the lives and livelihoods of their families and surrounding communities. When families are no longer able to sustain themselves, they risk becoming food insecure and dependent on

11 Centre for Humanitarian Action. (July 2021). Climate change, disaster displacement and (anticipatory) humanitarian actions: challenges ahead.
12 IFRC. (2021). Responding to Disasters and Displacement in a Changing Climate: Case Studies – Asia Pacific National Societies in Action.
13 Internal Displacement Monitoring Centre. (2021). Global Report on Internal Displacement 2021.
14 Oxfam. (2019). Forced from Home: Climate-fuelled Displacement.
15 IFRC. (2021). Responding to Disasters and Displacement in a Changing Climate: Case Studies – Asia Pacific National Societies in Action.
16 Ibid.
17 The figures come from an analysis of publicly available data provided by the Internal Displacement Monitoring Centre.
18 Reuters. (March 2021). Over 10 million displaced by climate disasters in six months: report.
19 Dasgupta, S. et al. (2007). The impact of sea level rise on developing countries: a comparative analysis (English). Policy, Research Working Paper no. WPS 4136. World Bank.
20 Rüegg, P. (26 March 2021). "Climate change significantly increases population displacement risk". Weather and Climate Risks Group, ETH Zürich.
21 IFRC. (2018). Disasters and Displacement in a Changing Climate: The Role of Asia Pacific National Societies. p. 5.
22 UN OCHA. (2021). Global Humanitarian Policy Forum. A case for transformation? The longer-term implications of the COVID-19 pandemic.
23 World Food Program USA. Climate Change & Hunger. Available at: https://www.wfpusa.org/drivers-of-hunger/climate-change/.
24 Ibid.
25 Chatham House. (2021). Climate change risk assessment 2021.

humanitarian assistance for survival. COVID-19 has only magnified this risk.

Over the past decade, almost half of the World Food Programme's (WFP) emergency and recovery operations have been in response to climate-related disasters, at a staggering cost of USD 23 billion.[26] More than 80 per cent of the world's food-insecure people live in settings prone to floods, drought, storms and other climate-related hazards.[27] This makes it more important than ever to ensure that people can effectively prepare, respond and recover from both sudden shocks and the effects of slow-onset climate change.

Climate and conflict

There is growing evidence that climate change and conflict are closely linked. A report by the International Committee of the Red Cross (ICRC) illustrates how countries affected by armed conflict are disproportionately impacted by climate variability and extremes due to the limited adaptive capacity of people, systems and institutions already coping with the consequences of conflicts.[28] Sixty per cent of the 20 countries most vulnerable to climate change are affected by armed conflict.[29] In a vicious cycle, the likelihood of conflict increases with a changing climate, and conflict makes communities less resilient to climate change.

Although climate change does not directly cause conflict, the effects of climate change can be considered "threat multipliers" that can intensify conflict patterns. For example, climate shocks such as sudden changes in precipitation and temperature can increase the likelihood of conflict and violence or the intensity of a conflict.[30] This is playing out in Syria where the long-standing armed conflict was preceded by a drought that caused hunger, mass migration and social discontent. In the Sahel, shrinking areas of arable land has forced farmer and herder communities to compete for resources, sparking conflict across the region.[31]

1.2 Tackling climate change

The climate crisis is a humanitarian crisis, and it will take a massive collective effort in climate mitigation and resilience-building to address the humanitarian consequences, both now and in the future. Mobile technology will not solve the challenge, but it does have a critical role to play in alleviating future climate-induced humanitarian emergencies.

The role of digital and mobile-enabled services in addressing climate-related hazards

Developments in digital and mobile-enabled technology provide unique opportunities to improve predictions of climate-related hazards, better anticipate responses and enable both communities and humanitarian responders to act faster and more efficiently when disaster strikes.

These opportunities are growing as global mobile penetration gathers pace. By 2025, global mobile subscribers are expected to increase to 5.8 billion, with Africa, Latin America and three South and Southeast Asian countries (Pakistan, Indonesia and Bangladesh) accounting for a large share of new connections.[32]

26 WFP. (n.d.). "Climate Action".
27 WFP. (n.d.). WFP and Climate Change: Helping Countries Increase Climate Resilience to Achieve Zero Hunger.
28 ICRC. (2020). When rain turns to dust.
29 Under-Secretary-General for Humanitarian Affairs, Mark Lowcock, (19 April 2021). ODI Humanitarian Policy Group/Institute for Security Studies webinar, "The climate crisis and humanitarian need: taking action to support the world's most vulnerable communities".
30 International Growth Centre. (2021). Does climate change cause conflict?
31 Under-Secretary-General for Humanitarian Affairs, Mark Lowcock. (19 April 2021). ODI Humanitarian Policy Group/Institute for Security Studies webinar, "The climate crisis and humanitarian need: taking action to support the world's most vulnerable communities".
32 GSMA Intelligence. (2018). The Mobile Economy 2018.

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Box 2

The mobile industry's commitment to climate action

The mobile industry has long been a leader in climate action. In February 2016, the mobile industry was the first industry to fully commit to achieving the 17 United Nations Sustainable Development Goals (SDGs). Since then, the industry has been working on all the goals, with a special focus on SDG13 – Climate Action. In February 2019, the GSMA board set a target on behalf of the industry to reach net-zero carbon emissions by 2050 at the latest. [33]

GSMA Mobile for Development support for climate change interventions

Over the past decade, GSMA Mobile for Development (M4D), with funding from donors, has supported many low-carbon and climate-resilient business models that leverage mobile technologies. The GSMA ClimateTech, AgriTech, Digital Utilities and M4H programmes are all seeking to unlock the power of digital technology in low- and middle-income countries (LMICs) to support climate change-related interventions.

GSMA Mobile for Humanitarian Innovation climate change projects

The GSMA M4H programme aims to accelerate the delivery and impact of digital humanitarian assistance. Climate resilience, including food security, has been one of five core focus areas of the programme over the past five years. This report spotlights projects in this critical focus area.

Through the Mobile for Humanitarian Innovation Fund and Strategic Partnerships, the programme facilitates partnerships between MNOs and humanitarian organisations to shape and support innovative projects, with a focus on leveraging mobile technology to address climate-related hazards, among other humanitarian challenges.

- **The GSMA Mobile for Humanitarian Innovation Fund** catalyses partnerships by providing financial and technical support for mobile-enabled innovations that seek to improve how crisis-affected populations engage and interact with those providing assistance, whether humanitarian organisations, governments or private actors.
- **The M4H Strategic Partnerships team** catalyses long-term partnerships between MNOs and humanitarian organisations by developing sustainable business models and providing technical advisory support. The team acts as an intermediary between MNOs and other digital service providers and the humanitarian community to find sustainable and scalable solutions to the challenges of delivering digital humanitarian assistance.

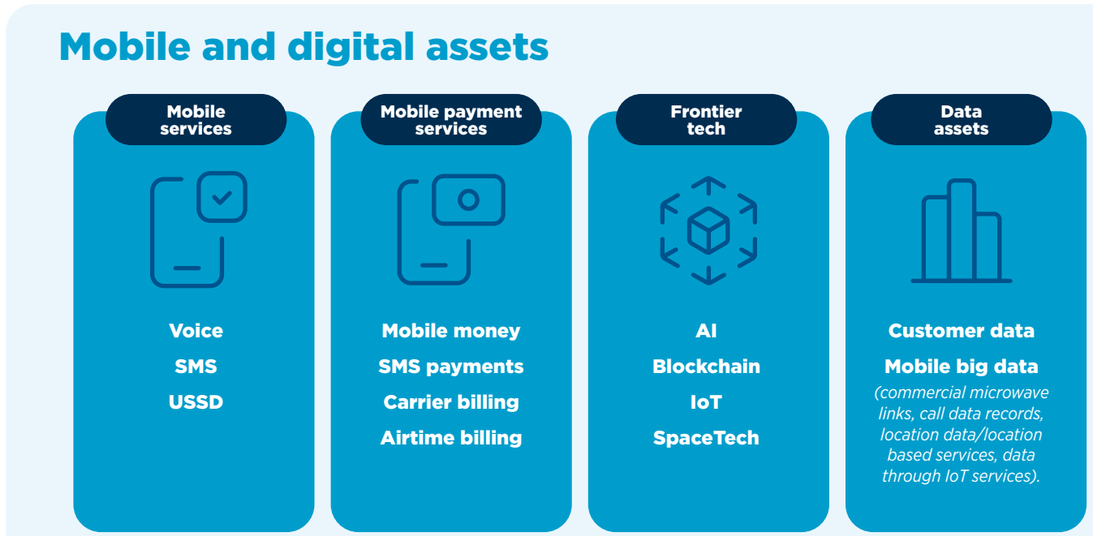
The projects supported through these partnership models are an opportunity to identify, share and better understand the role of digital and mobile-enabled solutions in addressing climate-related challenges in humanitarian contexts.

33 GSMA. (2021). Mobile Net Zero: State of the Industry on Climate Action 2021.

Mobile and digital assets

To understand the opportunities offered by digital and mobile-enabled services in the context of climate change, the GSMA has developed a conceptual framework of four types of mobile and digital assets.[34] These assets are outlined in each of the five case studies in this report and include:

1. **Mobile services:** voice, SMS, USSD, interactive voice response (IVR), mobile apps
2. **Mobile payment services:** mobile money, mobile money-enabled savings, mobile-enabled credit, mobile-enabled insurance
3. **Frontier technologies:** Internet of Things (IoT), artificial intelligence (AI), blockchain, space technologies, virtual and augmented realities, drones and robotics (including big data)
4. **Data assets:** customer data, mobile big data (commercial microwave links, call detail records, location data/location-based services, data through IoT services)



1.3 Report framework

To tackle climate-related hazards a two-pronged approach can be taken. First, focusing on long-term strategies centred around mitigation, reducing greenhouse gas (GHG) emissions, and second, devising strategies for resilience building. Mobile technology is uniquely positioned to provide and enable tools that can play a role in both mitigation and resilience building.

Split into these two overarching sections, the report outlines five use cases where mobile technology has a critical role to play in addressing the climate challenge in humanitarian contexts. It also provides seven case studies from six countries from across the M4H portfolio to showcase specific examples in practice.

34 GSMA. (2021). The Role of Digital and Mobile-Enabled Solutions in Addressing Climate Change.

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02. Mitigation

According to the IPCC, global surface temperature will continue to increase until at least 2050 under every emissions scenario.[35] The rate of increase will depend on the speed and scale of the reduction of greenhouse gases (GHGs). It is therefore essential to invest in **mitigation strategies** while also maintaining a focus on preparedness and resilience (see Section 3) and recognising that past emissions guarantee some level of warming in the future.

The humanitarian community has an important role to play in climate mitigation. This chapter outlines examples of how the humanitarian community can harness digital innovations to support mitigation strategies, specifically improving access to **clean energy.**

Box 3

Mitigation defined

Mitigation, or reducing climate change, involves reducing the flow of heat-trapping GHGs into the atmosphere, either by reducing the sources of these gases (for example, the burning of fossil fuels for electricity, heat or transport) or enhancing the "sinks" that accumulate and store them (such as the oceans, forests and soil).[36] Examples include generating electricity from renewable sources, shifting away from internal combustion engine vehicles and reducing agricultural emissions.

Box 4

A mismatch between GHG emissions and the burden of climate change

It is important to note that those who are most vulnerable to the devastating impacts of climate change are often those who contribute the least to global emissions. Eleven of the 17 countries with low or moderate GHG emissions are acutely vulnerable to the negative impacts of climate change.[37] This inequality will significantly worsen by 2030.[38] One example is Fiji, which emits about 2.38 tonnes of CO_2 per person every year compared to more than 16 tonnes per person in the United States. Yet, Fiji's very existence is threatened by climate change, with rapid sea level rise and saltwater intrusion making parts of the island nation uninhabitable.[39]

35 IPCC. (2021). Sixth Assessment Report (AR6) by the Intergovernmental Panel on Climate Change (IPCC) Working Group I.
36 NASA Global Climate Change. (n.d.). "Responding to Climate Change".
37 Althor, G., Watson, J. and Fuller, R. (2016). "Global mismatch between greenhouse gas emissions and the burden of climate change." Scientific Reports 6.
38 Ibid.
39 UN OCHA. (2021). Five lessons from the Global South on climate-related disasters.

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Use Case #1

Unlocking access to clean energy

One of the main ways to mitigate GHG emissions at the global level is through clean energy generation.[40] Energy is required for cooking, lighting, heating and cooling homes, communities, health clinics and schools. It is also essential for commerce, communication and mobility. Yet, for many crisis-affected populations, energy is expensive, dirty and dangerous.[41] In 2018, more than 800 million people did not have access to energy at all, with 86 per cent living in countries classified by the OECD as fragile.[42]

Improving access to energy is desirable not only because it is environmentally sustainable and has positive socio-economic impacts, but also because it is essential to creating conditions for peace and stability and escaping fragility.[43] It is therefore a critical area of focus for the humanitarian sector, which in recent years has been transforming the ways it uses and deploys energy.[44]

Mobile-enabled solutions for clean energy access

Mobile-enabled solutions can be part of a transformational scaling up of access to clean energy in humanitarian settings, particularly in areas not currently served by traditional grid infrastructure. Pay-as-you-go (PAYG) is a prime example of how mobile technology can help make clean energy affordable and more reliable for low-income populations, reduce their reliance on fossil fuels while also creating sustainable business models.[45,46] The PAYG solar sector alone now provides clean and affordable electricity to an estimated 27 million people.[47] Between 2016 and 2018, companies deploying PAYG accounted for 91 per cent of all investment in the off-grid solar market globally.[48] This success led humanitarian organisations and solar providers alike to consider whether PAYG solar could be a viable way to extend electricity to new and untapped off-grid areas, such as refugee camps.

Today, PAYG models are serving IDPs and refugees around the world, helping to reduce reliance on unsustainable fuel sources and strengthening the resilience of those most vulnerable to climate shocks. Through the Mobile for Humanitarian Innovation Fund, organisations have deployed a range of PAYG solutions, from clean cooking and solar home systems (Case study 1) to battery rental models and microgrid solutions[49] (Case study 2).

M4H Innovation Fund grantees Altech and BBOXX, both in the DRC, are testing new business models for their PAYG solar home systems to serve refugee and IDP customers, while Alight is testing the bundling of clean cooking and solar home system solutions in Uganda and Rwanda[50] (Case study 1). Another grantee, United Healthcare Distributors in Uganda, is operating a battery exchange model in several refugee camp settings in partnership with community health centres. Meanwhile, the M4H Strategic Partnerships team has been working with Alight and MeshPower to deploy solar-powered microgrids in Mahama refugee camp in Rwanda (Case study 2).

40 GSMA. (2021). The Role of Digital and Mobile-Enabled Solutions in Addressing Climate Change.
41 The Moving Energy Initiative: https://mei.chathamhouse.org/what-we-do/why-matters
42 Council on State Fragility. (2021). Scaling energy investments in fragile states.
43 Ibid.
44 Nature Energy. (12 December 2019). "Focus: Energy in humanitarian contexts".
45 GSMA. (2020). Finding smarter ways to improve energy access through mobile technology.
46 Casswell, J. (26 February 2019). "Electrifying Kakuma Refugee Camp: the case for pay-as-you-go solar home systems". GSMA Mobile for Development Blog.
47 CGAP. (2021). "How a New Set of Metrics Is Poised to Transform PAYGo Solar". CGAP Blog Series: Financial Inclusion and Energy.
48 GOGLA (2019), Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data
49 For more insights on the role of mobile technology in mini-grids see: Kibala Bauer, G. (29 May 2019). "Mini-grids, macro impact?" GSMA Mobile for Development Blog.
50 For lessons on bundling clean cooking and PAYG solar home systems from a GSMA Digital Utilities grantee, Vitalite, see: White, A. (13 October 2020). "VITALITE Zambia – learnings from providing pay-as-you-go smartphones through pay-as-you-go solar". GSMA Mobile for Development Blog.

Case study #1

Mwangaza: Improving access to clean energy in refugee settlements

PROJECT TYPE:	**GSMA M4H Innovation Fund**
COUNTRY:	**Rwanda and Uganda**
PARTNERS:	**Alight, BioLite, Solaris Offgrid, MTN mobile money (Rwanda and Uganda)[51]**
MOBILE AND DIGITAL ASSETS:	**Mobile services, Mobile payment service, Frontier tech (IoT)**
BUSINESS MODEL:	**Users pay for the products (clean cookstoves and solar home systems) over time using mobile money[52]**

SUMMARY:

Most people in refugee settlements in Uganda and Rwanda rely on traditional biomass fuel like firewood for cooking and kerosene for lighting. In the contexts where Alight (formerly American Refugee Committee) works, this dependency on firewood strains relations between refugees and host communities, which view refugees as contributing to environmental degradation due to their need to cut firewood. Shifting to solar lighting and cleaner cooking alternatives is a climate mitigation measure that also improves livelihoods and health. This connection is highlighted in the SDGs: achieving affordable and clean energy for all (SDG 7) is closely linked to climate action (SDG 13).[53]

Mwangaza, meaning "light", is a market-based approach to improving access to clean energy for cooking and lighting in refugee and host communities. In Bidi Bidi (Uganda) and Kiziba (Rwanda) refugee settlements, Alight and BioLite conducted an 18-month pilot project of an improved energy access kit that included the BioLite HomeStove and SolarHome 620. Customers pay for the kit in instalments using mobile money.

The project tested the adoption of clean energy sources and evaluated the effectiveness of different financing mechanisms, including conventional consumer finance, PAYG and credit. It was also an important proof-of-concept for combining livelihoods, environmental protection and fee-for-service models of humanitarian intervention.

In total, 519 solar home systems and 429 cookstoves were distributed, impacting the lives of more than 3,700 people. More than 95 per cent of customers indicated that their BioLite cookstove had helped reduce their fuel expenditure (kerosene, charcoal, wood, etc.). Customers also found they were able to use their phones more since they had better access to energy (98 per cent of customers in Bidi Bidi and 82 per cent in Kiziba).

IMPACT AND TESTIMONIAL:

"It has reduced the cost of firewood for those who managed to buy the cookstoves. It has changed the lifestyle of refugees in terms of lighting and even charging from home. The project is good and should continue providing safe and clean energy to refugees." – Bidi Bidi Camp Official

Alight estimates that every household that purchased an improved energy access kit will offset approximately 3.2 tonnes of CO2 emissions. Collectively, the households in the pilot project are anticipated to offset 2,700 tonnes of CO2 emissions.

51 MTN were not official GSMA partners of the Innovation Fund project, but partnered with Alight on the projects.

52 In this pilot, Alight was testing whether the partnership and business models were sustainable. The products were therefore subsidised during the grant period, which meant the project was not profitable. However, in the future, Alight plans to adjust the repayment terms to ensure that the model is sustainable over the long term.

53 Next Billion. (2019). The Planetary Potential of Banishing Kerosene Lighting – And How Entrepreneurship Can Help.

Displaced persons are among the most energy poor on the planet. Chatham House Moving Energy Initiative estimates that about 90 per cent of people living in refugee camps have no access to electricity,[54] relying instead on expensive, dirty and dangerous energy sources. Previous GSMA research has identified this as a key barrier to accessing digital technologies in humanitarian settings.[55] One way this can be addressed is through microgrids powered by solar (Case study 2).

Case study #2

Solar electrification in Mahama refugee camp

PROJECT TYPE:	**GSMA M4H Strategic Partnerships**
COUNTRY:	**Rwanda**
PARTNERS:	**Alight, MeshPower**
MOBILE AND DIGITAL ASSETS:	**Mobile service, Mobile payment service**
BUSINESS MODEL:	**Humanitarian organisations and local government cover the cost of their own energy consumption while refugees and host communities cover their costs at a discounted rate. Mobile phone charging station costs are billed directly to users by the service.**

SUMMARY:

Mahama Camp in Rwanda, which hosts nearly 50,000 Burundian refugees, is not connected to the national electricity grid. Before launching a solar electrification project in 2019, Alight supplied electricity to a health facility in the camp with an outdated and inefficient generator, which cost around $3,060 per month for the diesel alone.

The GSMA worked with Alight and MeshPower to provide solar installations through microgrids to meet the energy needs of camp residents and power camp management offices and the health facility, serving more than 27,000 people in total. The project also installed AC public lights in Mahama's market and surrounding areas, and provided a power supply to MTN kiosks, which serve as mobile phone charging points for refugees and host community members at a reduced cost. The solar charging points currently serve around 35,000 people.

IMPACT AND TESTIMONIAL:

"The project aims to drive economic development of the refugees and host community in Mahama. In partnership with Alight and MeshPower, MeshPower's innovative hybrid AC/DC grid technology is well suited to a refugee camp environment and this project is geared to serve as a demonstration site, paving the way for future installations in other camps throughout Rwanda and with possible replication in other countries." – Bernad Ojwang, Alight Country Director, Rwanda

54 Moving Energy Initiative: https://mei.chathamhouse.org/what-we-do/why-matters

55 Casswell, J., et al. (2019). The Digital Lives of Refugees: How Displaced Populations Use Mobile Phones and What Gets in the Way. GSMA.

03. Resilience

As climate-induced disasters become more common, the ability to withstand and respond to these events is increasingly important. The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) estimates that disasters affect 350 million people every year and cause billions of dollars of damage.[56]

In 2021 alone, the Caribbean experienced the most intense storm season on record, millions of people in Central America were affected by Hurricanes Iota and Eta, and the Sahel and Horn of Africa experienced intense prolonged droughts and flooding.[57] A key focus of the humanitarian community, therefore, has been on building resilience, both within the humanitarian system and in affected communities. One of the recommendations of the Task Force on Displacement at COP24 was to "strengthen preparedness, including early warning systems, contingency planning, evacuation planning and resilience building strategies and plans, and develop innovative approaches, such as forecast-based financing, to avert, minimise and address displacement related to the adverse impacts of climate change."[58]

> *"Investing more in adaptation measures like disaster risk reduction and resilience is a good return on investment. Every $1 invested in risk reduction and prevention can save up to $15 in post-disaster recovery."* **– United Nations Office for Disaster Risk Reduction (UNDRR)[59]**

56 UN OCHA. (2019). Global Humanitarian Overview 2019.
57 UN OCHA. (2020). 2020 OCHA Annual Report.
58 Task Force on Displacement. (2018). Report of the Task Force on Displacement.
59 UNDRR. (2021). "Funding".

Box 5

Resilience defined

Resilience is broadly understood as the ability to withstand disturbances.[60] Within the context of humanitarian operations, the UK Foreign, Commonwealth & Development Office (FCDO) has defined it as the "ability to anticipate, avoid, plan for, cope with, recover from and adapt to (climate related) shocks and stresses".[61] Likewise, the UN system has defined resilience as "the capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing, in order to reach and maintain an acceptable level of functioning and structure".[62]

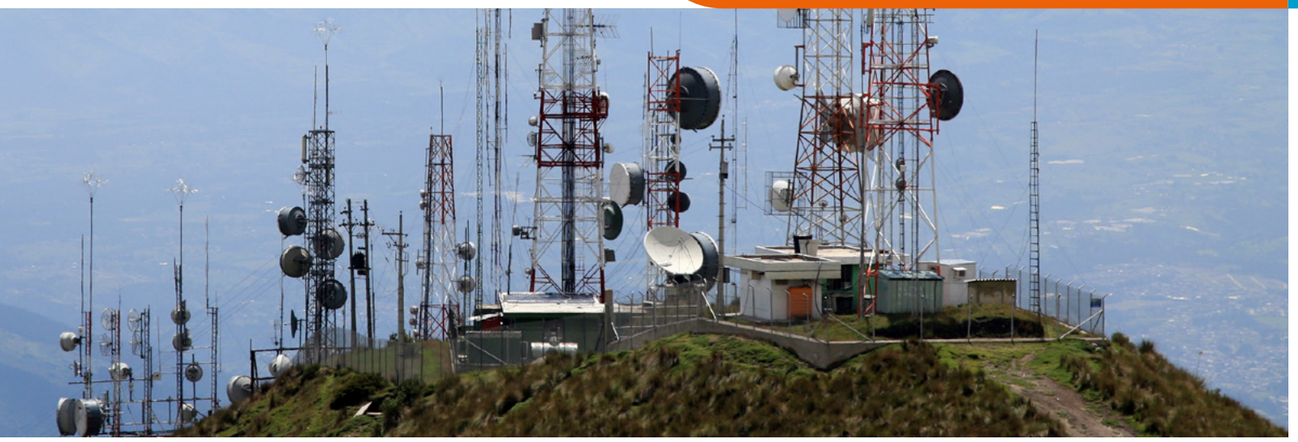
Resilience be strengthened at various levels – infrastructural, social and financial – and there are many frameworks that classify humanitarian interventions along the life cycle of climate-induced hazards. This report uses the framework created by the FCDO-funded programme, Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED). BRACED focuses on helping communities build resilience to climate extremes, and has created a conceptual framework based on three capacities:

1. **Adaptive capacity:** the ability to adapt to multiple, long-term and future climate change risks, and to learn and adjust after a disaster. It includes the ability to build back better, learning from past experiences and making communities less vulnerable to future shocks. This could include assisting those whose livelihoods are vulnerable to climate shocks to diversify their income streams or using historical rainfall data to better predict weather patterns.
2. **Anticipatory capacity:** the ability to anticipate and reduce the impact of climate variability and extremes through preparedness and planning. For example, this could include forecasting tools that allow communities to take pre-emptive action, like protecting assets ahead of a storm.
3. **Absorptive capacity:** the ability to face and manage adverse conditions, emergencies or disasters using readily available skills and resources. This includes the social systems, skills and resources to respond and recover from shocks.[63] For example, this could include the ability of communities or households to build financial assets so that when damage does occur they can rebuild.

Mobile technology has an important role to play in building the resilience of both communities and humanitarian organisations,[64] and the M4H programme has supported several innovative initiatives. Four use cases from the M4H portfolio are featured in this chapter, along with examples of projects that the M4H programme has supported.

Within each example, the resilience capacity as defined by BRACED is identified. In some cases, the initiatives contribute to more than one capacity.

60 Holling, C.S. (1973). "Resilience and Stability of Ecological Systems". Annual Review of Ecology and Systematics.
61 DFID. (2014). "KPI4 Guidance". UK Department for International Development.
62 UNISDR. (2005). "Hyogo Framework for 2005–2015: Building the Resilience of Nations and Communities to Disasters."
63 Bahadur, A.V., et al. (2015). The 3As: Tracking Resilience Across BRACED.
64 Downer, M. and Hamilton, Z. (2021). Building resilience through mobile-enabled solutions: Lessons from the Mobile for Humanitarian Innovation Fund. GSMA.



Use Case #2

Building financial resilience through mobile services

In areas affected by climate change, building financial resilience at the household level is vital. Financial assets provide a buffer against the impact of a disaster, allowing households to recover and rebuild without cutting out other basic necessities like food or education.[65] This can be done in a variety of ways, from livelihood programming to cash support, and mobile technology can facilitate this, connecting affected communities to essential services and support.

The GSMA M4H programme focuses on mobile financial services in humanitarian contexts due to the many advantages offered by mobile channels.[66] For example, cash and voucher (CVA) assistance delivered through mobile money has benefits for humanitarian organisations and recipients alike. For humanitarian organisations, mobile money offers greater transparency, accountability, speed and cost-effectiveness. For recipients, it can bring greater dignity, flexibility, security, discretion and opportunities for financial inclusion. With more than a billion mobile money accounts worldwide,[67] there is vast potential to rapidly scale up support for communities vulnerable to the effects of climate change. The GSMA has partnered with the World Food Programme (WFP) to explore how mobile channels can be used to support the communities they work with.

The M4H programme has supported several initiatives that use mobile financial services to build resilience to the effects of climate change (see Case study 3).

"The UN World Food Programme is honoured to grow our partnership with the GSMA. Together we are harnessing the power of mobile to save lives and change lives. The support of the GSMA enables us to improve our response to crises and natural disasters through the WFP-led Emergency Telecommunications Cluster and to empower families with greater dignity and choice through cash-based transfers – $2.1 billion of which we distributed in 2019 alone. Our collaboration will have an enduring impact on the lives of those facing food insecurity worldwide." **– Enrica Porcari, CIO and Director of Technology, World Food Programme and Chair of the Emergency Telecommunications Cluster (ETC)**

65 Bahadur, A.V., et al. (2015). The 3As: Tracking Resilience Across BRACED.

66 For example, GSMA. (2019). Mobile money enabled cash delivery: Essential considerations for humanitarian practitioners; GSMA. (2019). Mobile money enabled cash aid delivery: Operational handbook for mobile money providers; and GSMA. (2019). Mobilising cash and voucher assistance programmes: the case for mobile money.

67 GSMA. (2021). State of the Industry Report on Mobile Money 2021.

Case study #3

Voice identification for CVA in Somaliland

PROJECT TYPE:	GSMA M4H Strategic Partnership
COUNTRY:	Somaliland
PARTNERS:	CARE International, Telesom
MOBILE AND DIGITAL ASSETS:	Mobile payments
BUSINESS MODEL:	The costs related to building and piloting the voice ID system were covered by Telesom while CARE's cash programme was supported by USAID

SUMMARY:

In Somaliland, CARE International supports families affected by drought. The region is facing a quickly worsening situation as dry conditions have reduced the amount of available potable water, increased the risk of water-borne diseases and dramatically increased food insecurity, putting hundreds of thousands of lives at risk. The drought has also threatened the livelihoods of pastoralists in the region who have lost livestock.[68]

To better support communities affected by drought, CARE worked with Telesom to develop a voice ID technology that provided a faster and easier way to deliver cash and voucher assistance (CVA). The pilot project supported drought-affected households in 17 villages in the Sanaag and Sool regions of Somaliland.

Using interactive voice response (IVR), the platform used a voice signature, rather than a fingerprint or written signature, to verify a recipient's identity and trigger a cash transfer. Because the project used biometric data, extra measures were put in place to ensure that users' rights and privacy were respected. Clear responsibilities were laid out to ensure that data was collected, stored, protected and used in an ethical manner. In total, 2,000 households used the technology to receive their cash transfers and 99 per cent were able to access their cash successfully.

The pilot yielded positive results for all stakeholders. End users were satisfied with the technology and how quickly they were able to access their cash. Eighty-five per cent said that they found the registration process easy to use, and users reported having a greater sense of privacy and control over the process. The vast majority recommended that the system be used in future programming. For CARE, the pilot also had significant benefits. The team was able to verify many more recipients and were confident that the transfers were reaching the right people. It also reduced the travel required, as staff previously had to travel hundreds of kilometres to verify recipients. This was not only costly, but dangerous. CARE estimates that the voice ID technology reduced the costs of identity verification by 50 per cent or about 12 working days per staff member. For Telesom, the pilot was an opportunity to work directly with a humanitarian organisation to refine a technology solution that could be scaled with other partners and commercial projects.[69]

IMPACT AND TESTIMONIAL:

"This system of payment is very good because there are no middlemen. It is transparent and you do not assume there is any mismanagement or corruption." – Female user.

68 CARE. (2021). Somalia drought: why people urgently need UK Aid.

69 GSMA. (2021). Verifying recipients of cash assistance through Voice ID: Pilot project lessons and outcomes.

Beyond direct cash assistance, the M4H programme has also supported a project that builds the financial resilience of pastoral and agro-pastoral communities in Kenya. Led by World Vision Kenya, the Coast and Northern Kenya Integrated Emergency Response Project (KIERP) seeks to increase the adaptive and absorptive capacities of target communities. Climate change has intensified drought and flooding in the region, creating harsher conditions for land and livestock and reducing farmers' productivity. More frequent and severe flooding has also damaged livelihoods, infrastructure and water sources.

In addition to WASH and malnutrition activities, the project is supporting financial resilience in two primary ways. First, World Vision Kenya is supporting the creation of digital village savings and loans associations (VSLAs), including training in financial services to support financial inclusion. Second, they are working to train farmer groups in agri-business and climate-smart agriculture. This integrated programme seeks to strengthen the adaptive and absorptive capacities of farmers through digital financial inclusion, asset-building and preparing their businesses to withstand the impacts of climate change.

Other use cases, including social safety net programming,[70] weather index insurance[71] and savings products on mobile devices,[72] also have tremendous potential to leverage mobile payment platforms.

70 Gitobu, C. (18 March 2021) "The shift to mobile technology for amplified government and humanitarian cash and voucher assistance amid the COVID-19 pandemic in Kenya." GSMA Mobile for Development Blog.
71 Raithatha, R. and Priebe, J. (2020). Agricultural insurance for smallholder farmers: digital innovations for scale. GSMA.
72 GSMA. (2019). Harnessing the power of mobile money to achieve the Sustainable Development Goals.

Use Case #3
Strengthening farmers' resilience through agritech

As outlined in Section 1.1, food insecurity is a significant humanitarian challenge that has been compounded by the effects of climate change and COVID-19. Before the onset of the pandemic, it was estimated that nearly 690 million people were food insecure, or 8.9 per cent of the global population.[73] The situation has only worsened since then as economies slowed around the world. Over the course of 2020, an additional 20 million people were acutely hungry, and it is estimated that an additional 35 million people will be hungry in 2021.[74] This situation is magnified in conflict zones. There are currently 22 on-going food crises in countries affected by conflict,[75] and eight of the 10 countries affected by the most severe food crises worldwide host refugees, asylum seekers and IDPs.

One way to tackle this significant and growing issue is by strengthening local agricultural systems and the resilience of farmers. It is estimated that 60 to 80 per cent of food-insecure people worldwide rely on agriculture for their livelihoods.[76] By strengthening their ability to withstand climate-induced shocks, farmers can improve the food security of not only their own household, but also their surrounding communities. For example, in Yemen, violence often means that people can be cut off from food assistance for weeks or even months. Local crops and food supplies can help support local communities until they regain access to national supply chains.[77] Likewise, supporting pastoral communities is key to maintaining food security. Pastoralists can convert natural resources into both food and income, however, climate change and conflict make these communities especially vulnerable to hunger. The UN Food and Agriculture Organization (FAO) Predictive Livestock Early Warning System found a significant correlation between available forage for animals and the nutritional intake of children under five.[78]

Mobile technology has a vital role to play. The GSMA AgriTech team focuses on the role of mobile technology in the agricultural sector,[79] and have found that the resilience of farmers can be strengthened by, for example, providing weather forecasts and agroclimatic advice via mobile phones or mobile financial services like agricultural insurance.[80] To support pastoralists, the programme has supported the GARBAL project in West Africa and Afriscout in East Africa, which use satellite imagery and information supplied by farmers on pasture quality and livestock concentration.[81]

Several M4H grantees and partners are also helping farmers become more resilient. The KIERP initiative in Kenya trains farmer groups in agribusiness and climate-resilient farming, provides farmers with water quality analysis and partners with the government to support crop and livestock operations. Integrated with cash and financial resilience programming, this programming can strengthen agricultural resilience. In Pakistan, Naya Jeevan is working with partners to build the resilience of farmers and indigenous communities in Pakistan (Case study 4).

73 FAO. (2020). Tracking progress on food and agriculture-related SDG indicators 2020.
74 IRC. (2021). Ending the hunger crisis: response, recovery and resilience.
75 Ibid.; FAO. (2018). FAO's role in humanitarian contexts.
76 FAO. (2018). FAO's role in humanitarian contexts.
77 Ibid.
78 Ibid.
79 GSMA. (2021). "GSMA Agritech Programme".
80 GSMA. (2021). "Digital Solutions for Climate Resilience in Agriculture".
81 Peitosi, S. (22 January 2021). "Digital solutions for pastoralists during COVID-19". GSMA Mobile for Development Blog.

Case study #4

Muhinjo Sohno Thar (MST) project

NAYAJEEVAN

PROJECT TYPE:	**GSMA M4H Innovation Fund**
COUNTRY:	**Pakistan**
PARTNERS:	**Naya Jeevan, Sukaar Foundation, doctHERs, Telenor**
MOBILE AND DIGITAL ASSETS:	**Mobile services, Mobile payments**
BUSINESS MODEL:	**Donor funded, users pay for livestock insurance**
RESILIENCE CAPACITY:	**Adaptive**

SUMMARY:

The Muhinjo Sohno Thar ("My Beautiful Thar", MST) project is working to strengthen the resilience of cattle-herding communities in Pakistan's Tharparkar district. In this desert region, pastoralists are often forced to migrate in search of water and better grazing. One aim of the project was to reduce climate-induced migration.[82] It addressed this in several ways. First, it educated pastoralists on how to manage and protect their livestock from climate-induced shocks. This included preventing dehydration and increasing resistance to drought-induced diseases. Basic treatment and vaccinations were provided by trained livestock workers.

Second, a televeterinary health programme connected pastoralists to veterinarians. While users faced some challenges due to low connectivity, they found phone consultations beneficial as they could receive medical advice on their animals without having to travel to get them treated.

Finally, livestock insurance was available in small monthly payments to protect families from the financial shock of the death of an animal. Insurance was offered through EasyPaisa, Telenor Pakistan's mobile money offering, and field insurance agents helped to register new users. Some users reported using EasyPaisa for more than insurance payments, and if future programming included more digital literacy components it could help to increase uptake of mobile financial services.

IMPACT AND TESTIMONIAL:

Customers interviewed for the project evaluation reported they were very satisfied with the livestock insurance, veterinary health care and televeterinary health consultancy services. The MST project increased the use of mobile money in the region and strengthened resilience by improving access to mobile-enabled financial services. It also enabled users to receive veterinary support without incurring the time and costs of travelling long distances.

"Earlier, when our livestock used to get sick, we used to take them to Mithi [larger town in Tharparkar] and sometimes the animals would die during the commute. I insured my livestock, and my cousin and my uncle did as well. It benefitted us, because we would call the vet and if there is a minor issue, the vet guides us on the phone which medication we should use and the animals become well again." – Farmer in Tharparkar

82 The programming also includes non-resilience-focused programming, which includes mental health support, support for women's livelihoods, telehealth consultations and awareness-raising sessions on mental health and hygiene.

Use Case #4

Early warning for early action

According to the World Bank, early warning systems (EWS) are one of three key initiatives in which investment could make a big difference and significantly reduce loss of life during climate-related disasters. EWS are one of the most well-documented use cases of mobile technology building resilience to climate-induced shocks. Mobile technology can be used to detect an upcoming crisis and disseminate information, both to those at risk and those responding to it.

Collecting appropriate data is vital for humanitarian organisations and affected communities to take appropriate anticipatory action.[83] Mobile technology can play a key role in the detection of extreme events, including through user surveys, linking to national detection systems or monitoring through mobile networks. For example, in Sri Lanka, Wageningen University, the Royal Netherlands Meteorological Institute and Dialog Sri Lanka piloted the use of commercial microwave links (CMLs) to monitor rainfall. CMLs connect mobile base stations in mobile networks using radio connections. Rainfall changes the signal strength of these connections, allowing it to be observed at a very high resolution. These observations fill a crucial gap in weather data in LMICs and enable services such as weather nowcasts (high-resolution forecasts of rainfall in the near future) and flood and landslide early warnings (for which rainfall amounts are key inputs).[84, 85]

Mobile technology is an effective way to share information and data quickly with populations who may be affected by an extreme weather event, and with the organisations that will be responding. In many contexts, mobile network operators (MNOs) have worked with governments and regulatory bodies to create EWS for extreme weather events by linking to remote sensor networks and partnering with national alert programmes. A good EWS takes a multi-channel approach (TV, radio, mobile, etc.), and MNOs often play a critical role in disseminating information over cell broadcast, SMS, IVR or through a disaster alert app.[86]

For example, after the 2004 Indian Ocean tsunami, Dialog Axiata in Sri Lanka developed the Disaster and Emergency Warning Network (DEWN). The system connects subscribers, emergency responders, community leaders and the general public to a national emergency monitoring centre housed at the National Disaster Management Centre. The system disseminates messages through as many channels as possible, including mobile handsets, TV, radio and special DEWN alarm devices. In Nepal, Ncell has partnered with the Department of Hydrology and Meteorology to broadcast early warning SMS to people living along major river basins when there is a risk of floods or landslides. In 2017, more than six million SMS were sent over a one-week period to residents living in downstream river basin areas, preventing the potential loss of life and livestock.

The key to a successful EWS is ensuring that dissemination channels are available and accessible to the communities it is targeting. It is therefore important to understand what technologies target audiences use, what channels are accessible and what languages they prefer.[87] Mercy Corps' CHANTER project used human-centred design (HCD) to better target users with appropriate early warning information (Case study 5).

83 Schneider, S., Radtke, K. and Weller, D. (2021). Climate Change, Disaster Displacement and (Anticipatory) Humanitarian Action: Challenges Ahead.
84 Priebe, J. (2021). Digital Innovation for Climate-Resilient Agriculture: Using rainfall data from mobile networks for localised and scalable services. GSMA.
85 GSMA. (2019). Video: "Rainfall monitoring through mobile technology in Sri Lanka".
86 Hamilton, Z. and Tillekeratne, D. (2020). Building a Resilient Industry: How Mobile Network Operators Prepare for and Respond to Natural Disasters. GSMA.
87 Downer, M. and Hamilton, Z. (2021). Building resilience through mobile-enabled solutions: Lessons from the Mobile for Humanitarian Innovation Fund. GSMA.

Case study #5

Communities in Haiti Access New Technologies for Early Warning/ Response (CHANTER)

MERCY CORPS

PROJECT TYPE:	GSMA M4H Innovation Fund
COUNTRY:	Haiti
PARTNERS:	Mercy Corps, Viamo, Digicel
MOBILE AND DIGITAL ASSETS:	Mobile services (IVR, SMS)
BUSINESS MODEL:	Funding from humanitarian programming budgets
RESILIENCE CAPACITY:	Adaptive, Anticipatory

SUMMARY:

The CHANTER project supports communities in Haiti by limiting income loss after a disaster, protecting households and reducing the risk of sudden onset disasters, which are becoming more frequent in the country. Using Viamo's IVR platform and Digicel's network, CHANTER was designed to deliver a 12-week training on extreme weather preparedness, first response practices and early warning messages. It therefore not only serves as an EWS, but also builds the capacity of communities to cope with extreme events. Content was tailored to users' locations and livelihood activities to ensure it was relevant, and the team used HCD approaches to co-create the training and deliver it alongside local community organisations. The project conducted preliminary research to assess connectivity, technical feasibility, mobile penetration and digital literacy levels, which revealed that low levels of digital literacy and a high prevalence of feature phones made IVR the most appropriate channel to reach their intended audience.

IMPACT AND TESTIMONIAL:

In total, 16,672 people registered on the CHANTER platform, 11,763 of whom listened to more than 75 per cent of the messages.

While no major weather events occurred in Haiti during the grant period, an evaluation of the service found that 84 per cent of users had acted on one of the suggestions. It also found that more than 99 per cent of users felt the information they received was relevant to them, and 99 per cent thought the CHANTER platform was useful.[88] Several CHANTER users also reported sharing information from the messages with other people in their community who did not have access to a phone or had not signed up.

Building on the lessons of the CHANTER project, Mercy Corps has developed five additional projects in partnership with Viamo. These projects aim to reach 2.5 million people across three countries in the Americas. One of these projects is LAVE (meaning "wash" in Haitian Creole), which is using the CHANTER approach to deliver messaging to vulnerable populations in Haiti to reduce the spread of COVID-19. The service has reached more than two million people to date.

"I told the neighbours what to do when a disaster hits the community. And after the disaster ends, I would visit people to see if there were any victims."
– Woman, farmer

88 GSMA. (2021). M4H Innovation Fund lessons and outcomes: CHANTER.

Use Case #5

Targeting disaster relief efforts

After an extreme event occurs, mobile technology can help build absorptive capacity by assessing the impact of the event and targeting the response. Within the M4H portfolio there are three primary ways that mobile technology is helping to target relief efforts.

First, mobile networks can provide basic connectivity, allowing communities and responders to communicate and coordinate in the aftermath of a disaster and identify where support is available. Since 2015, the GSMA has worked with MNOs on the Humanitarian Connectivity Charter (HCC), an industry-wide initiative to support MNOs in providing better access to communication and information for those affected by crises. It sets out principles for the mobile industry and the humanitarian sector to work in partnership to provide connectivity and access to information to support humanitarian response. To date, the HCC has been signed by 159 MNOs operating in 111 countries, and endorsed by key industry vendors and humanitarian stakeholders.[89]

There are many ways that HCC signatories ensure resilient networks and stable connectivity in times of crisis. Digicel Group, for example, has robust protocols to keep their network stable and prepare staff in the event of a disaster. They have customer-facing communication plans and work directly with humanitarian responders to ensure efficient coordination.[90] Another example is Ericsson Response, a global volunteer initiative operated by Ericsson that works with humanitarian partners to provide telecommunications support during disasters and in other aid and development contexts. Both these initiatives allow humanitarian organisations to better assess the situation on the ground in the aftermath of a disaster and target their responses.

There are two other ways in which mobile technology is being used in the M4H portfolio to support humanitarian relief efforts. Nokia Saving Lives uses unmanned aerial vehicle technology to assess damage and target relief (Case study 6) and several projects have used anonymised, aggregated phone-based surveys and CDR data to assess risk, population movements and target humanitarian assistance following a disaster (Case study 7).

Finally, M4H grantee grantee Geopoll uses phone-based, computer-assisted telephone interview (CATI) surveys to collect food security data, including food prices, market operability, crop harvest data and frequency of meal consumption.[91] The CATI surveys are conducted with individuals via mobile channels, either a call or SMS survey, and supplemented with online surveys. The data is then used in partnership with the WFP to provide real-time information on food security and nutrition to guide rapid humanitarian programming. Geopoll intends to explore the potential for overlaying anonymised and aggregated CDR to monitor population movements and further assist humanitarian organisations in targeting aid appropriately.

89 Hamilton, Z. and Tillekeratne, D. (2020). Building a Resilient Industry: How Mobile Network Operators Prepare for and Respond to Natural Disasters. GSMA.
90 Ibid.
91 Geopoll. (n.d.). "Food Security Research".

Case study #6

Nokia Saving Lives (NSL)

NOKIA

PROJECT TYPE:	GSMA M4H Innovation Fund
COUNTRY:	The Philippines
PARTNERS:	Nokia, Philippine Red Cross, Smart Communications
MOBILE AND DIGITAL ASSETS:	Frontier tech, Mobile services
BUSINESS MODEL:	Funding from humanitarian programming budgets
RESILIENCE CAPACITY:	Absorptive

SUMMARY:

Nokia Saving Lives (NSL) is a non-profit corporate initiative that has worked with the Philippines Red Cross and MNO Smart Communications (Smart) to develop an unmanned aerial vehicle (UAV) to assess damage in the aftermath of sudden onset events. The UAVs pair with real-time applications, such as video streaming, onboard sensors, mapping and analytics, to allow NSL to provide information to first responder teams who then rapidly assess the situation and respond as quickly as possible based on the available information.

At emergency response sites, mobile broadband connectivity is provided by Nokia wireless technology while Smart is responsible for creating a secure and reliable network. If an emergency occurs, Smart would ensure connectivity and the Philippine Red Cross and Nokia volunteers would use the UAVs to collect vital assessment data.

The equipment used by responders are connected through a private wireless network, which enables reliable on-site communication, centralised data collection (for on-site AI processing), and access to a broader range of information to determine relevant response data, such as the number of required personnel and impacted people, or to identify what equipment is needed.

Demonstrations and pilot projects have been successful. Responders were able to assess multiple sites from one hub, and the UAVs were deployed for three separate events during the grant period. Following an earthquake in 2019, for example, infrastructural damage was assessed in conjunction with the Red Cross team and the data was used to assist in the recovery effort.

Since the end of the grant period, Nokia has incorporated the solution into their commercial private wireless offerings for clients undertaking search and rescue activities in the aftermath of a disaster. The technology underpinning the solution is now being used around the world, in disaster resilience contexts as part of the Sendai City Tsunami Warning System in Japan, in fire departments in Belgium, as well as in infrastructure, utilities and public safety projects, including the New York Power Authority

IMPACT AND TESTIMONIAL:

"This project underlines our commitment to use Nokia technology for good in collaboration with our partners and existing ecosystems. Furthermore, we have proven that private wireless and UAV technology in collaboration with first responders can improve the efficiency and ease efforts in the field, when every second counts. Whenever there is a tiny little chance of mitigating risks for people or saving lives, every engineering effort is worth it." – Thomas Eder, Senior Engineering Manager, Nokia

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Case study #7

FlowKit

FLOWMINDER.ORG

PROJECT TYPE:	GSMA M4H Innovation Fund
COUNTRY:	Multiple
PARTNERS:	Flowminder Foundation
MOBILE AND DIGITAL ASSETS:	Mobile services, Frontier tech, Data assets (big data analytics)
BUSINESS MODEL:	Donor funding to develop and provide open source (free) to users, with optional fee-based consultancy support
RESILIENCE CAPACITY:	Anticipatory

SUMMARY:

Flowminder streamlines and automates data extraction to allow humanitarian organisations to respond to crises quickly and efficiently. With an M4H Innovation Fund grant and support from DIAL, Flowminder developed FlowKit, an open-source toolkit that allows call detail record data (CDR), a dataset automatically generated by MNOs for billing purposes, to be processed and analysed safely and securely.

Flowminder developed FlowKit to enable MNOs and humanitarian actors to securely analyse CDRs and estimate population flows before, during and after disasters. FlowKit is installed and controlled by MNOs on their premises, behind their firewall, which enables operators, Flowminder or other authorised parties to generate automated data analytics that humanitarian actors can use to target their relief efforts after a crisis. A pilot project during the grant period allowed Flowminder to demonstrate that data outputs could be generated rapidly in the aftermath of a disaster. This process, which typically takes 11 days, could be completed by FlowKit within three to four days.

FlowKit is currently installed in several countries globally, including Haiti and Ghana where Flowminder released mobility reports during the COVID-19 pandemic.

IMPACT AND TESTIMONIAL:

"One of the key challenges during an emergency is getting help to those who need it the most as efficiently as possible. The issue is timely access to accurate information about the movements of people, particularly after a natural disaster, so we waste a lot of time and money trying to get food, shelter and other assistance to those who need it. A tool like FlowKit could really change things. This could save lives, not just time and money." – Christine Latif, World Vision[92]

92 Flowminder. (2019). FlowKit: Unlocking the power of mobile data for humanitarian and development purposes.

04. Conclusion

The effects of climate change will worsen in the coming years. Recent reports project that global surface temperatures will continue to rise until at least 2050, increasing the frequency and intensity of climate-related hazards.[93] Communities least equipped to manage the disruption, and least responsible for climate change, will be affected most. To tackle this existential threat, a significant scale up of investment in climate-smart action, alongside strong policy frameworks, are vital to reduce global emissions.

It is undeniable that humanitarian systems must be strengthened to mitigate and build resilience to the future effects of climate change and create a more sustainable future. Central to these efforts must be prioritising those who are most at risk and ensuring they participate in decision making.

Mobile technology, which has reached about two-thirds of the world's population, can and should be harnessed within the humanitarian sector to achieve this goal. Five use cases have been highlighted in this report to demonstrate examples from the M4H network and portfolio where mobile technology has played a role. By working with the mobile industry and exploring the power of technology to address humanitarian challenges, the GSMA believes that the humanitarian sector can be strengthened by its response to the climate crisis.

The M4H programme will continue to share lessons and evidence as they emerge. We will also be seeking answers to the following questions:

- What other mobile use cases in the humanitarian sector could fight the causes and effects of climate change?
- What are the best models that leverage mobile technology to improve access to clean energy for the forcibly displaced?
- How can mobile technology be used to reduce food insecurity?
- How can humanitarian organisations balance the benefits of scale and efficiency that come with disseminating information through mobile technology with the need for locally led, content-specific and accessible information?
- How can CDR be best used to provide timely and targeted humanitarian support, and what are the best ways to ensure data privacy and protection?
- How can the humanitarian sector rethink its approach to operations to have a greener humanitarian response, and what role can mobile technology play in this?

The M4H programme looks forward to engaging with new and existing partners on these topics, and to hearing reflections on the programme's work and approach to date.

93 IPCC. (2021). Sixth Assessment Report.

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05. Glossary

Climate-related hazard – A hazard refers to the potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.[94] A climate-related hazard includes all extreme weather and climate events and can be separated into slow-onset events and sudden-onset events.

- **Slow-onset events**[95] – Such events can include desertification, sea level rise, salinisation, land and forest degradation, loss of biodiversity, glacial retreat, drought,[96] ocean acidification and increased temperatures.
- **Sudden-onset events**[97] – These events can include floods, storm surges, tropical cyclones, wildfires, heatwaves and heavy rainfall.

Disaster – Severe alterations in the normal functioning of a community or society due to hazardous physical events interacting with vulnerable social conditions. Disasters lead to widespread adverse human, material, economic or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.[98]

Early warning system (EWS) – The set of technical, financial and institutional capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organisations threatened by a hazard to prepare to act promptly and appropriately to reduce the possibility of harm or loss. Depending on the context, EWS may draw on scientific and/or Indigenous knowledge. EWS are also considered for ecological applications, (e.g., coral bleaching alerts), in agriculture (e.g., warnings of ground frost, hailstorms) and in fisheries (storm and tsunami warnings). This definition builds on those used by UNISDR (2009) and the IPCC (2012a).

Exposure – The presence of people; livelihoods; species or ecosystems; environmental functions, services and resources; infrastructure; or economic, social or cultural assets in areas and settings that could be adversely affected.[99]

Fragility – The propensity of a conflict to lead to violence.[100]

Hazard – The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.[101]

Impacts (consequences, outcomes) – The consequences of realised risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather and climate events), exposure and vulnerability. Impacts generally refer to effects on lives; livelihoods; health and well-being; ecosystems and species; economic, social and cultural assets; services (including ecosystem services); and infrastructure. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial.[102]

Risk – The potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. In the context of the assessment of climate impacts, the term risk is often used to refer to the potential for adverse consequences of a climate-related hazard, or of adaptation or mitigation responses to such a hazard, on lives; livelihoods; health and well-being; ecosystems and species; economic, social and cultural assets; services (including ecosystem services); and infrastructure. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence.[103]

Vulnerability – The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.[104]

94 The Intergovernmental Panel on Climate Change Glossary.
95 United Nations. (2010). Framework Convention on Climate Change.
96 Drought is not included in the United Nations Framework Convention on Climate Change, but desk research has led us to include it in this definition.
97 There is no universal definition for sudden-onset events. GSMA has therefore listed the most common climate-related events gathered from desk research.
98 The Intergovernmental Panel on Climate Change Glossary.
99 Ibid.
100 Energy and Economic Growth. (2017). Energy, fragility and conflict: Briefing note.
101 The Intergovernmental Panel on Climate Change Glossary.
102 Ibid.
103 Ibid.
104 The Intergovernmental Panel on Climate Change Glossary.

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