MOBILE DATA FOR HUMANITARIAN ACTION

Pathways to Sustained and Responsible Data Use

GSMA Mobile for Development

M4D

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This report builds on a broader history of GSMA work on responsible mobile data use, AI for social impact and enabling policy environments, including work undertaken through GSMA's AI for Impact and Public Policy teams. The authors are grateful to all reviewers and contributors who provided feedback, challenged assumptions and helped refine the analysis.

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EXECUTIVE SUMMARY

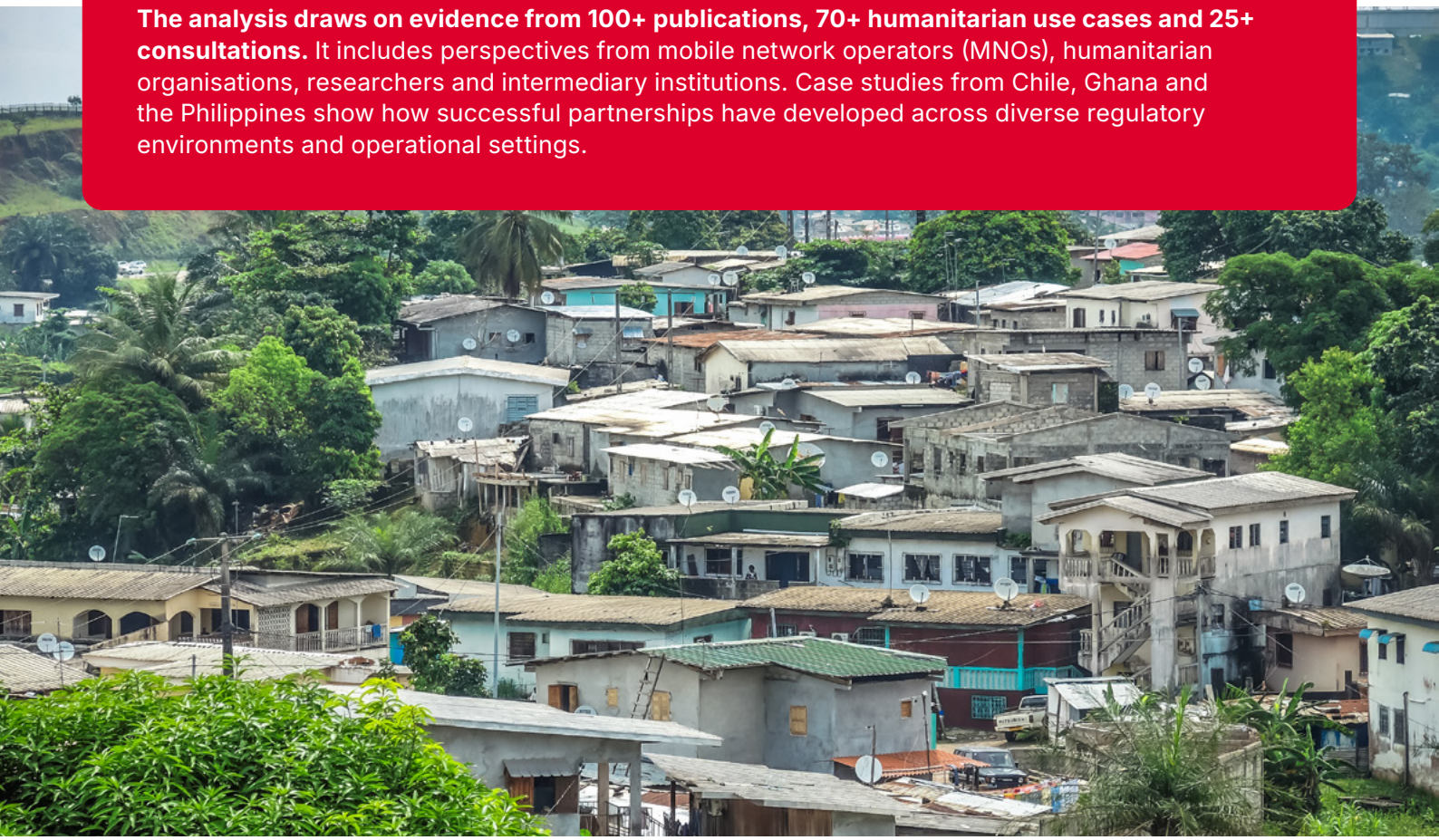
Humanitarian decision-making increasingly depends on the speed and quality of available data. As crises unfold, understanding how populations move and where needs are emerging in real time is central to effective response. Yet this information is often difficult to secure, particularly when access is limited or official data does not reflect conditions on the ground.

Mobile data can offer insights into population behaviour at significant scale. With 96% of the global population covered by mobile networks and 5.8 billion unique subscribers worldwide, the mobile industry generates data that can reveal patterns of movement, needs and disruption.[1] Over the past decade, these analytical uses have been widely explored through research and pilots, while humanitarian interest has grown as organisations seek more granular evidence to support preparedness and response.

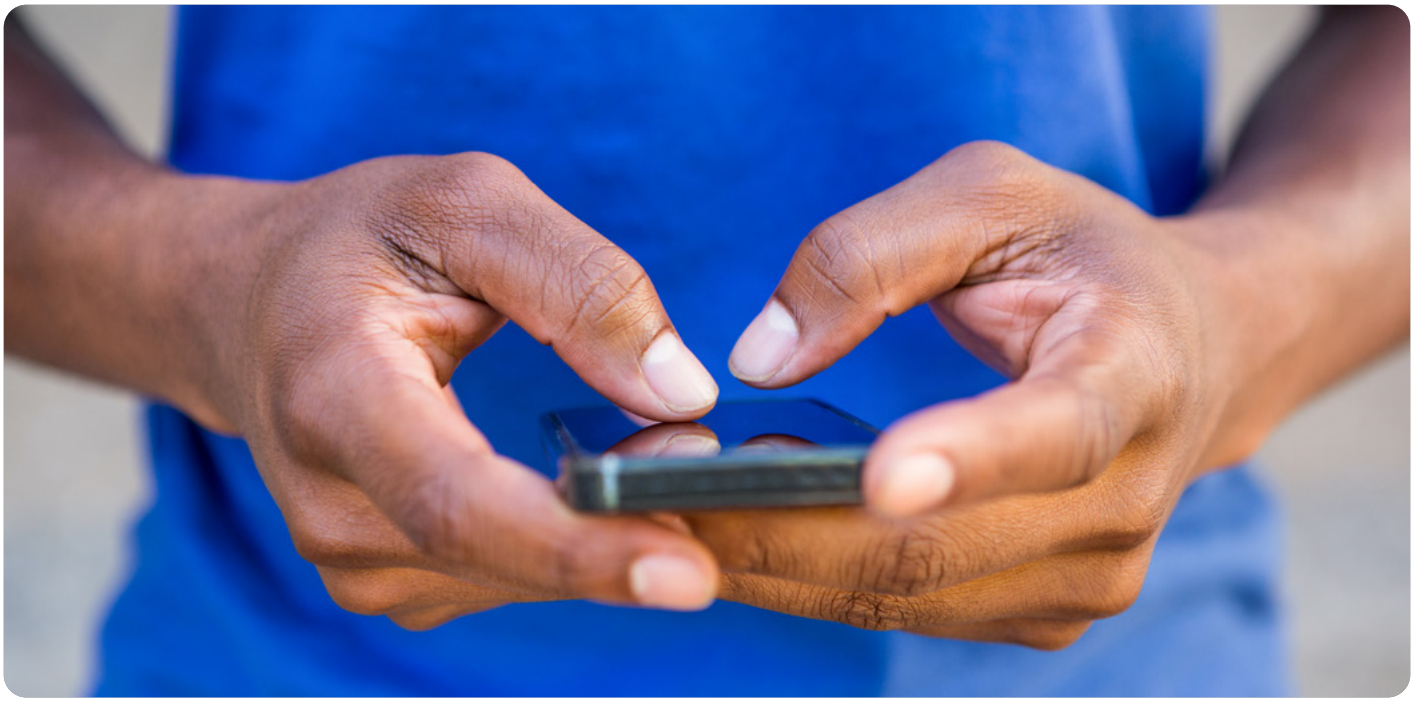
The potential value of this data is significant, but conditional. Mobile network data is commercially sensitive, tightly regulated and closely linked to customer privacy. Its utility in humanitarian contexts therefore depends on clear governance frameworks and safeguards that define what insights can be produced and how they can be used responsibly.

This report examines the role of mobile data in an increasingly data-driven humanitarian sector. It shifts the discussion beyond whether these datasets can be used in crisis contexts to a more practical question: under what conditions do mobile data collaborations generate meaningful insights for humanitarian action, and how can these partnerships be strengthened and sustained over time?

The analysis draws on evidence from 100+ publications, 70+ humanitarian use cases and 25+ consultations. It includes perspectives from mobile network operators (MNOs), humanitarian organisations, researchers and intermediary institutions. Case studies from Chile, Ghana and the Philippines show how successful partnerships have developed across diverse regulatory environments and operational settings.



1 GSMA. (2025). The Mobile Economy 2025.



Key takeaways

- **Mobile data has demonstrated practical value across several humanitarian use cases.** It has informed displacement tracking, disease modelling and more targeted assistance. Its insight is strongest when combined with other evidence, helping decision-makers interpret population movement and risk in context.
- **Mobile data initiatives differ from MNOs' wider contribution to humanitarian action.** MNOs have supported humanitarian efforts for many years, but projects involving network data bring distinct privacy, regulatory and commercial considerations. Humanitarian actors often prioritise broad access and rapid application, while MNOs manage data as a sensitive asset within regulated markets. This shapes how partnerships work in practice.
- **Governance takes time to establish but is central to responsible use.** The use of mobile data depends as much on institutional arrangements as analytical capability. Effective collaborations require set authorisation, defined roles and agreed protocols for access and oversight – particularly in crisis settings.
- **Established data-sharing approaches have clarified how privacy and risk can be managed.** The research identified five key models, ranging from direct data release to provider-side analysis. Approaches that keep sensitive data within MNO systems while sharing aggregated outputs are better placed to reduce exposure and manage risks.
- **Several partnership models have proven viable.** Case studies from Chile, Ghana and the Philippines show that public-private collaborations are most effective when governance is clearly defined, data exposure is limited and roles are anchored within trusted institutions.
- **Sustained impact requires mobile data initiatives to be designed beyond a single project or crisis.** Systems that support more than one use case are better placed to move beyond short-term analysis. Financing, capacity building and institutional ownership help maintain these arrangements over time.
- **The landscape for mobile data partnerships is becoming more structured.** Advances in AI, growing demand for more granular evidence and regulatory changes are shaping how future initiatives develop. This creates an opportunity to move from isolated analysis to more durable models for humanitarian insight and impact.

1. INTRODUCTION

1.1 Mobile data in a changing humanitarian landscape

As a crisis unfolds, humanitarian responders need to quickly understand how communities are behaving and where needs are emerging. Are families evacuating ahead of a forecasted storm? Which locations are receiving displaced groups? Are people returning home or relocating elsewhere? These questions shape life-or-death decisions about where resources are deployed and which communities are prioritised, both in the early hours of a disaster and over the course of protracted crises.

Yet the information needed to answer these questions is often difficult to secure. Field assessments take time and resources to deploy. Community surveys require teams on the ground. National statistical data may not reflect rapidly changing conditions - or may not exist at all. As a result, humanitarian organisations frequently operate with incomplete or delayed information about how crises are affecting people.

In such contexts, mobile network data can offer powerful insights into population behaviour. Every day, billions of routine interactions with mobile networks generate data that reflect how populations move, communicate and use digital services. When aggregated and anonymised, these datasets can reveal changes in population activity within hours or days, rather than weeks, as with traditional information sources.[2]

Demand for real-time insights has grown as the humanitarian sector adapts to an increasingly complex operating environment. As of 2026, more than 239 million people require humanitarian assistance and protection amid mounting pressures on a resource-constrained sector.[3] Practitioners are also exploring how novel datasets can strengthen evidence-based decision-making.[4] Together, these developments have reinforced interest in how mobile network data could support more efficient and effective humanitarian action.

2 Yabe, T. et al. (2022). "Mobile phone location data for disasters: A review from natural hazards and epidemics". Computers, Environment and Urban Systems, Vol. 94.
3 Humanitarian Action. (2026). Global Humanitarian Overview 2026.
4 Novel data sources can be defined as data that is not initially produced for humanitarian response but can be used to improve situational awareness. See: Hodkinson, K. (31 July 2025). "Assessing the Potential of Novel Data Sources". Centre for Humanitarian Data.

1.2 Evolution of mobile data evidence and applications

Early work on mobile phone data for humanitarian use focused on establishing what was technically possible. Following the 2010 Haiti earthquake, researchers analysed anonymised mobile network data to understand population displacement from Port-au-Prince, providing one of the first large-scale demonstrations of how telecommunications data could reveal population movements after a disaster.[5] Similar approaches were later applied during the 2014–2016 West Africa Ebola outbreak, where mobility patterns derived from mobile network activity were used to support modelling of disease spread and inform public health response strategies.[6]

In the years that followed, research and pilots explored how mobile data could contribute to humanitarian analysis and policy planning. For example, studies examined evacuation behaviour during disasters, analysed mobility patterns during epidemics and developed methods to estimate population distribution in data-scarce environments. These efforts helped establish many of the analytical techniques now widely used in mobile data research.

The COVID-19 pandemic marked a major inflection point in the use of mobile data. MNOs, governments and international organisations worked together to use aggregated mobility indicators from more than 40 countries to inform public health responses, with support from the GSMA and other global organisations.[7] While this period demonstrated the scale at which these approaches could operate, it did not lead to widespread institutional adoption.

More recent initiatives have therefore focused on embedding mobile data analysis within national systems and developing the partnerships required to sustain public-private data collaborations. These efforts are increasingly linked to broader priorities around disaster preparedness and anticipatory action. Advances in AI and machine learning are also expanding the analytical potential of mobile datasets, reinforcing interest in how they can contribute to more timely and impactful humanitarian analysis.[8]

1.3 Navigating humanitarian mobile data initiatives

Mobile network data can provide valuable insights into population behaviour during crises, but its use raises important questions about individual privacy and appropriate safeguards. As interest in data-driven humanitarian approaches has grown, so too has attention on how such data can be used responsibly.

For MNOs, the realities can be complex. Mobile data initiatives involve navigating regulatory obligations, commercial sensitivities and potential reputational risks associated with the handling of customer data. At the same time, humanitarian organisations must ensure that the use of large-scale behavioural datasets aligns with principles of responsible data use and does not lead to unintended harm.[9]

These considerations shape how mobile data collaborations emerge and evolve. Meaningful analysis requires continued partnerships across MNOs, researchers, governments and humanitarian organisations. As a result, the value of mobile data in humanitarian contexts depends not only on analytical capability but on the institutional arrangements and governance frameworks that enable data to be used safely and effectively.

5 Bengtsson, L. et al. (2011). "Improved Response to Disasters and Outbreaks by Tracking Population Movements with Mobile Phone Network Data: A Post-Earthquake Geospatial Study in Haiti". PLoS Med.
6 Wesolowski, A. et al. (2014). "Commentary: Containing the Ebola Outbreak - the Potential and Challenge of Mobile Network Data". PLoS Currents.
7 The GSMA's Big Data for Social Good Initiative supported global efforts to leverage MNO data during the COVID-19 pandemic. This included 17 MNOs in Europe, covering 22 countries. In LMICs, the GSMA received requests from more than a dozen LMICs. Learn more: GSMA. (2021). Utilising mobile big data and AI to benefit society.
8 Aiken, E. et al (2022). "Machine learning and phone data can improve targeting of humanitarian aid". Nature, 603.
9 Beduschi, A., Marelli, M. and Martin, A. (Eds.). (2025). Data Protection in Humanitarian Action. Responding to Crises in a Data-Driven World.

1.4 Scope and approach of this report

This report examines the current use of mobile network data in humanitarian contexts and what recent experience reveals about collaborations that work. Drawing on examples from multiple countries, the report situates initiatives within the broader evolution of mobile data use and identifies lessons that can inform future projects. Particular attention has been given to contexts where mobile data has moved beyond experimental analysis to more operational use under established responsible data practices. It also considers lessons from initiatives that have not progressed past pilot phases. Importantly, the report includes the perspectives of MNOs in these engagements to articulate the practical constraints and opportunities from an industry perspective.

By examining how these initiatives have developed, the report aims to move the discussion beyond whether mobile data can be used in humanitarian contexts to a more practical question: **under what conditions do mobile data collaborations create meaningful insights for humanitarian action, and how can these partnerships be strengthened and sustained over time?**

Methodology

This report examines several key areas of interest:

- How mobile network data is used to support humanitarian analysis and decision-making
- How data responsibility is navigated
- What factors motivate or discourage MNOs from participating in such initiatives
- How evolving dynamics across the humanitarian sector and mobile industry affect these collaborations
- Which partnership and data-sharing models have proven viable in practice

It draws on the following key sources of evidence:

100+ **publications and reports** examining "mobile data for good" projects

70+ **documented humanitarian use cases** involving mobile data

25+ **consultations with stakeholders** including MNOs, humanitarian organisations, researchers and intermediary organisations involved in mobile data initiatives

The analysis focuses primarily on low- and middle-income countries (LMICs), where humanitarian needs are most acute. It builds on insights from a wider body of literature, drawing on evidence from GSMA initiatives, as well as research and the operational experience of international institutions and other established actors working with mobile data for social good.[10,11]

10 See GSMA resources such as Mobile Big Data Solutions for a Better Future; Artificial Intelligence and Mobile Big Data: Use cases delivering SDG impact; Mobile Big Data for Cities: Urban climate resilience strategies for low- and middle-income countries; AI for Impact; and Navigating the Path of Responsible AI.

11 See, for example: the World Bank's Global Data Facility – Mobile Phone Data programme 2026 courses: Foundations in Mobile Phone Data for Policy and Technical Foundations in Mobile Phone Data for Policy; UN-CEBD's Task Team on Mobile Phone Data resources, including: Methodological Guide on the Use of Mobile Phone Data: Displacement and Disaster Statistics; and The Global Partnership for Sustainable Development Data's resources: A Roadmap to Accessing Mobile Network Data for Statistics.

GSMA Humanitarian for Innovation programme

Strengthening responsible digital ecosystems

The GSMA Mobile for Humanitarian Innovation (M4H) programme catalyses partnerships between MNOs and the humanitarian sector, invests in innovation through a dedicated fund, unlocks policy barriers through advocacy and builds a learning and research agenda to inform the future of digital humanitarian response.

Together, these activities underpin an overarching goal of building responsible digital ecosystems for better emergency preparedness, response and recovery.

From exploring Connectivity in Crises to the digital identities of refugees, reflections on data use and privacy protection in humanitarian contexts have been woven throughout the M4H portfolio. Our work has examined how insights derived from mobile networks can contribute to targeted humanitarian action – while recognising the governance considerations and safeguards required when working with sensitive datasets and at-risk communities.

Driving data-led innovations

As part of the **GSMA Innovation Fund**, M4H has invested in **41 innovative and scalable humanitarian mobile and digital solutions since 2018**. Several projects have explored how data generated by mobile networks and related infrastructure can support humanitarian decision-making, including:

- **Flowminder – FlowKit software:** The GSMA supported the development of FlowKit, an open-source software suite that enables the secure processing and analysis of anonymised call detail records (CDRs). The system runs within an MNO's infrastructure and produces aggregated indicators of population mobility and distribution, allowing humanitarian partners to generate insights while sensitive customer data remains protected within operator environments. FlowKit was installed in Ghana and Haiti, where Flowminder partnered with MNOs, **Vodafone** and **Digicel**. It has since been used in several markets across Africa and Asia.
- **TAHMO – rainfall monitoring in Ghana:** Another project supported a flood early warning system that integrated commercial microwave links (CML)[12] from mobile masts to monitor rainfall data and Internet of Things (IoT)-enabled sensors to provide hydro-meteorological data. Working with MNO **AT Ghana**, the mobile data was used to strengthen rainfall monitoring and flood forecasting.

Catalysing public-private partnerships

A core focus of the M4H programme is creating partnerships between the mobile industry and the humanitarian sector. Between 2023 and 2025, the M4H team collaborated with humanitarian partners and 76 MNOs in more than 30 countries to improve the delivery and impact of digital humanitarian assistance.

By combining the expertise of MNOs and humanitarian organisations, M4H has supported improved coordination and effectiveness in crisis response and recovery efforts. These partnerships help to translate mobile-enabled capabilities into practical applications, contributing to more impactful outcomes for crisis-affected communities.

This experience provides a strong foundation for identifying shared values and effective ways of working between the humanitarian sector and mobile industry when assessing data-driven partnerships.

12 Mobile base stations are connected by backhaul networks that distribute data throughout the mobile network. This network is comprised of fibre optic cables or wireless connections using microwave radio frequencies. During rainfall events, wireless CML signals are weakened, disrupting signal strength. Analysis of these signal variations can calculate rainfall intensity in real time. Learn more: GSMA. (2021). Digital Innovation for Climate-Resilient Agriculture.

2. HOW MOBILE DATA CAN SUPPORT HUMANITARIAN ACTION

This chapter provides a snapshot of where mobile data has demonstrated value in humanitarian contexts. It reviews the main types of mobile network data that have been leveraged, the most common use cases and the factors shaping how these insights can be applied.

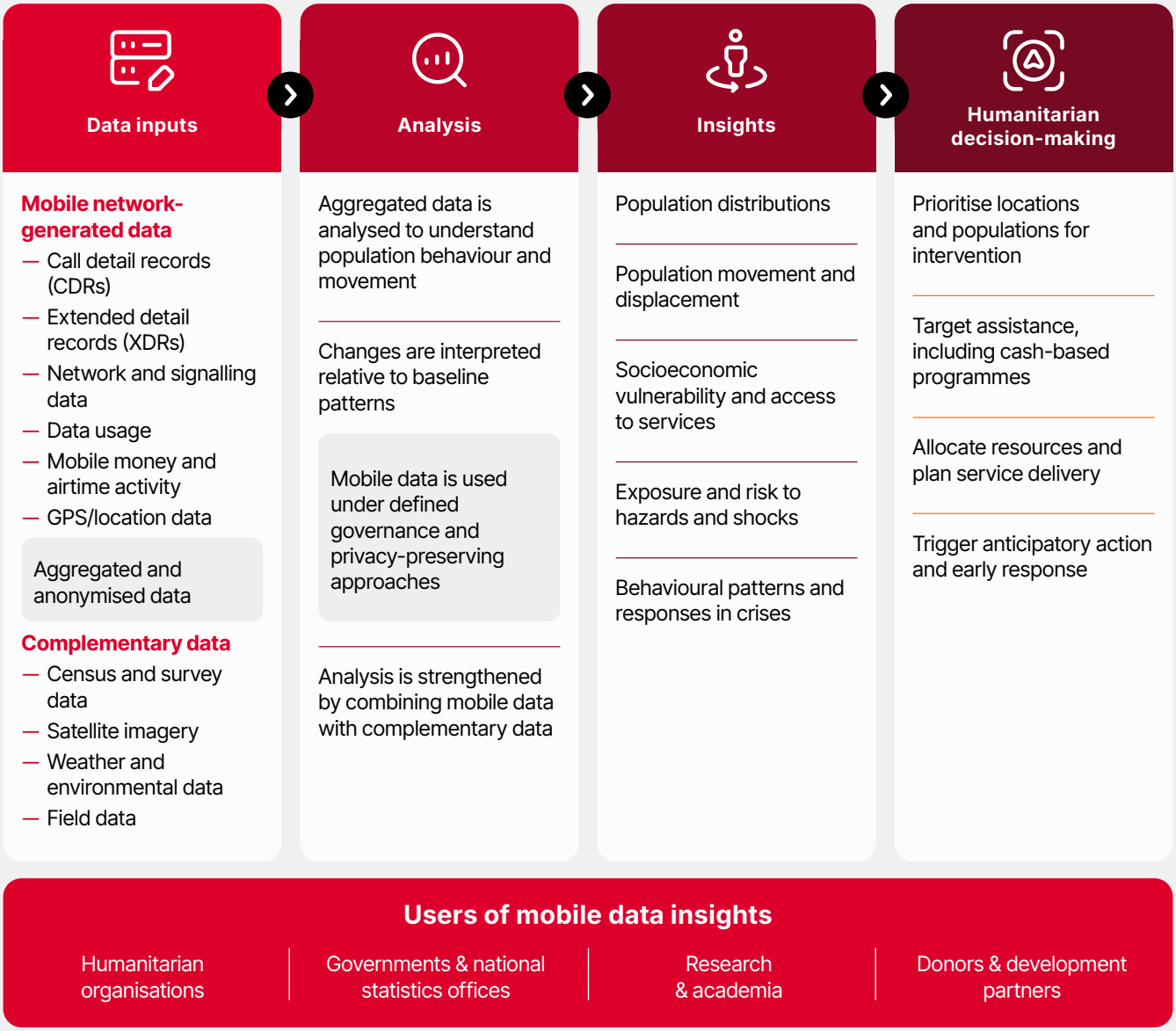
2.1 What is mobile data?

Mobile networks generate large volumes of operational data as a by-product of operation and service delivery. This data is created when mobile devices interact with key infrastructure, for example, when making a call, sending a message, using data or moving between cell towers.

In this report, the terms "mobile network data" and "mobile phone data" refer to aggregated and anonymised network-generated datasets derived from these interactions. This data does not reveal the content of communications. Instead, it provides structured information about patterns such as device activity, locations and customer movements over time.

Figure 1

Mobile data for humanitarian action



Based on the projects reviewed, the most widely used datasets historically are call detail records (CDRs), which capture metadata associated with voice calls and SMS events for billing purposes. Other sources include network signalling data, which record interactions between devices and the network even when calls or messages are not taking place, as well as eXtended Detail Records (XDRs), which capture a wider range of network events linked to a customer's data usage, including app-level interactions such as WhatsApp, Signal or Viber.

Table 1

Examples of mobile data used in humanitarian analysis

Data type	Description	Typical humanitarian use
CDRs	Metadata on the time, duration and approximate cell location of voice calls and SMS messages	Displacement tracking, mobility monitoring, outbreak modelling, crisis situational awareness
XDRs	Broader event-level metadata capturing network interactions beyond voice and SMS, including data usage and app-level interactions, e.g. WhatsApp or Signal	Mobility patterns in locations where app usage is higher than voice calls/ SMS, behavioural response monitoring, network usage during crises
Signalling data/ network telemetry	Device-tower interactions generated as devices register with the network; includes commercial microwave link data	Short-term movement analysis, emergency evacuation pattern analysis
Mobile money and airtime top-up data	Financial and behavioural indicators derived from digital financial services usage and airtime purchases	Poverty and needs analysis, cash transfer targeting, estimates of migrant population distributions
GPS/location data	Geolocation data collected through smartphone apps or device operating systems, typically shared through consent-based app permissions	Precise movement tracking, evacuation mapping, population presence estimates, transport accessibility during crises

Why many humanitarian projects focus on CDR data

Several characteristics make CDR-derived datasets the most widely used mobile data in humanitarian analysis:[13]

- **CDRs are generated across both smartphones and basic handsets.** This is important in many LMICs where smartphone penetration remains uneven.
- **CDRs are passively generated as part of routine network operations**, meaning they do not require users to opt-in to location tracking.
- Compared with richer datasets, **CDR-derived indicators are typically easier to aggregate and anonymise under privacy safeguards.**

For these reasons, most humanitarian use cases reviewed relied primarily on indicators derived from CDR data, even though other network datasets may offer more granular insight.

While this report focuses on data generated by mobile networks, there is a wider ecosystem of digital trace data used in humanitarian contexts, including GPS, app-based location data and social media datasets.[14] These sources can track movements to precise locations within short time intervals. However, their relevance depends on smartphone penetration, which apps or platforms people use and whether location sharing is enabled. Access is also different, typically requiring agreements with platform providers or commercial licensing rather than MNO-led arrangements.

13 Flowminder: "What are the strengths of CDR data?"
14 Pietrostefani, E. et al. (2025). Dynamic Estimates of Displacement in Disaster Regions: A Policy-driven framework triangulating data.

2.2 Key humanitarian use cases

Mobility and displacement analysis

The number of people displaced has nearly doubled in a decade, increasing to an estimated 117 million in 2026.[15] Understanding how populations move during crises remains a central analytical challenge for the sector to help humanitarian agencies reach people with life-saving assistance.

Mobility analysis is the most established and mature application of mobile network data in humanitarian contexts. Aggregated CDR-based indicators have been used to estimate displacement flows, monitor returns and track redistribution during disasters, epidemics and conflict.

Recent examples include:

- **Mapping earthquake-driven displacement in Turkey:** Researchers analysed both CDR and XDR datasets around the catastrophic 2023 earthquake in Turkey, using it to identify groups of displaced persons travelling to different locations. The analysis revealed stark disparities in evacuation capacities between Turkish citizens and Syrian refugees, driven primarily by existing socio-economic and legal inequalities.[16]
- **Understanding conflict-driven displacement in the Democratic Republic of Congo (DRC):** Pseudonymised[17] CDRs were analysed in 2025 to identify displaced populations following conflict in the eastern region of the country. Aggregated mobility indicators supported the rapid enrolment of displaced households in a remote cash transfer programme.[18]

These examples show how mobile data can help humanitarian actors understand population redistribution in near-real time, particularly in contexts where field access is limited. The analytical strength lies in detecting relative change from baseline patterns, with insights showing whether movement has shifted geographically or declined.

Health surveillance and disease modelling

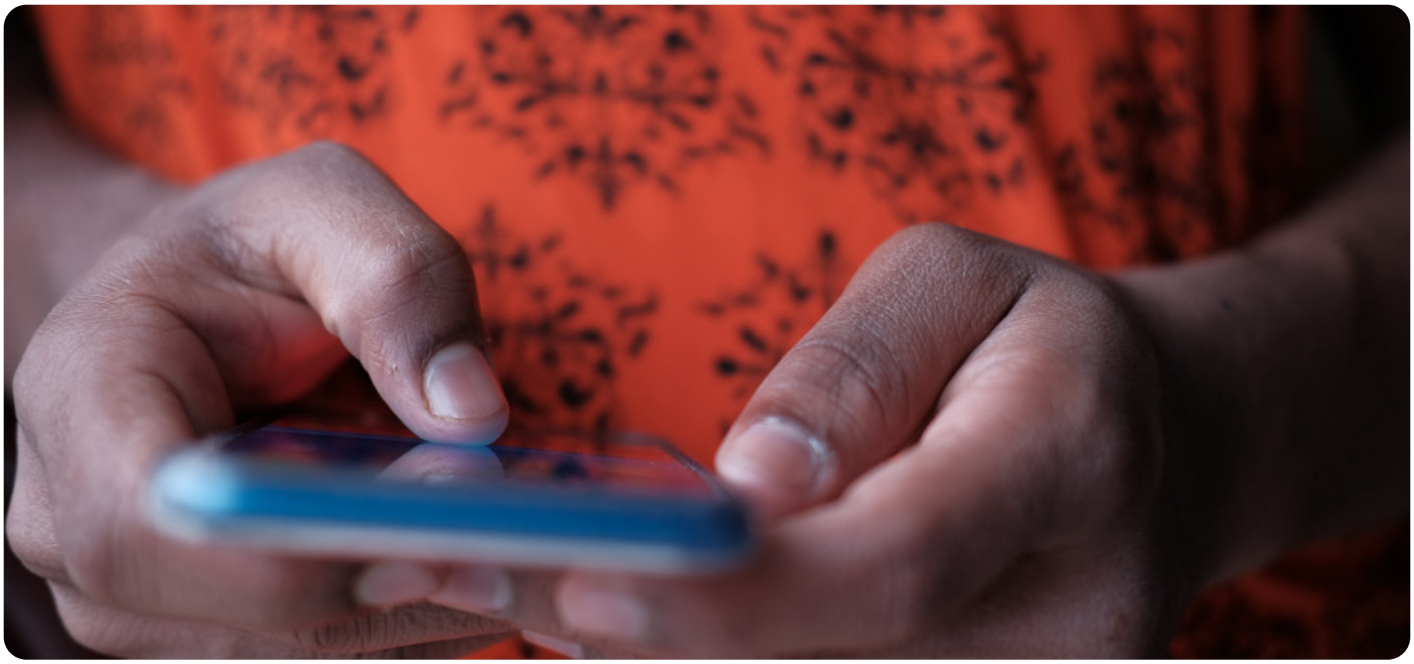
Population mobility is also a key factor shaping the spread of infectious disease. Mobile network data has been widely used to improve assumptions about human movement within epidemiological models.[19] It has informed modelling during outbreaks of malaria, cholera, measles, dengue, Ebola and COVID-19, helping to estimate how diseases spread between regions.

Examples include:

- **COVID-19 response, global:** Mobile data-backed analysis was used globally to manage the spread of the virus, including in LMICs such as Benin, Burkina Faso, the DRC and Rwanda. Its application spanned population mobility monitoring, epidemiological modelling and policy evaluation.[20]
- **Vaccination planning, DRC:** Monthly population and mobility estimates are produced for 380 health zones in the DRC to support the Ministry of Health's Expanded Programme on Immunisation. The mobile data is weighted and scaled to the general population using survey data, then made available to health practitioners to improve childhood vaccination planning and coverage across the country.[21]

However, using this data for longer-term disease forecasting is somewhat limited. While mobility indicators can improve short-term modelling assumptions, disease dynamics in protracted crises are shaped by a range of political, economic and social variables beyond what network-derived data can capture.

15 UNHCR. (2025). Global Appeal 2025.
16 Aydoğdu, B. et al. (2025). "A novel activity space approach to discover displacement patterns via mobile phone data: An analysis of the 2023 Türkiye-Syria Earthquakes". EPJ Data Science, 14(61).
17 Pseudonymisation is defined in Article 4(5) of GDPR as "the processing of personal data in such a manner that the personal data can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not attributed to an identified or identifiable natural person." See: Guidelines 01/2025 on Pseudonymisation.
18 Flowminder. (2025). Mobility estimates derived from Vodacom Call Detail Records: DRC Population Mobility and Displacements.
19 Cheng, X. et al. (2025). "Mobile phone data analyses for public health research: a scoping review". Frontiers in Public Health.
20 Milusheva, S. et al. (2021). "Challenges and opportunities in accessing mobile phone data for COVID-19 response in developing countries". Data & Policy.
21 Flowminder. (16 May 2025). "DRC health officials gain cutting-edge mobility data for childhood vaccination planning".



Poverty mapping and resource allocation

Mobile network metadata is increasingly being used to improve understanding of crisis-affected populations and support more precise targeting of humanitarian assistance. The sector has shifted to cash-based assistance, often delivered digitally because it offers recipients greater choice and can be delivered at scale with lower operational friction. Data is now strengthening how these programmes are designed and targeted, improving efficiency and reducing exclusion and inclusion errors.

For example, broader patterns of mobile phone usage – such as call length and frequency, data usage and airtime purchases – can be analysed using machine learning techniques to estimate proxies for socio-economic status.[22] Evidence from studies in Togo, Bangladesh, Malawi and the DRC suggests these approaches can complement or strengthen traditional targeting methods where administrative data is incomplete or outdated.[23]

Examples include:

- **Cash transfer targeting, Togo:** Anonymised mobile phone metadata (such as airtime puchases and calling patterns) were used to infer which individuals were likely to be among the poorest. A machine learning model translated these behavioural signals into a proxy for income level, which was then used to prioritise recipients for emergency cash transfers. Compared to geographic targeting approaches, this method reduced exclusion errors by 4%–21%, meaning a higher share of vulnerable individuals could be reached successfully.[24]
- **Identifying ultra-poor households, Afghanistan:** Researchers combined household survey data with mobile phone usage records from programme participants. The mobile data provided continuous behavioural indicators while the surveys offered ground-truth measures of poverty. Machine learning models trained on both datasets were able to classify households by poverty level more accurately than models relying on either data source alone, improving the identification of those most in need.[25]

However, higher-frequency and financially sensitive data – such as those used in cash assistance programmes – can bring greater risks to identifying individuals based on transaction patterns. It is also important to remember that mobile phone behaviour remains a proxy for welfare rather than a direct measure. Impact therefore depends on the strength of the model calibration, data representativeness and triangulation against ground-truth data.[26]

22 Steele, J. et al. (2021). "Mobility and phone call behavior explain patterns in poverty at high-resolution across multiple settings". Humanities and Social Sciences Communications, 8.
23 Lummis, V. (4 September 2025). "Five things we've learned using mobile data and AI/ML to identify people in need". GiveDirectly.
24 Aiken, E. et al. (2022). "Machine learning and phone data can improve targeting of humanitarian aid". Nature, 603.
25 Aiken, E. et al. (2023). "Program targeting with machine learning and mobile phone data: Evidence from an anti-poverty intervention in Afghanistan." Journal of Development Economics, 161.
26 Sekara, V. et al. (2023). Are machine learning technologies ready to be used for humanitarian work and development?

Anticipatory action and early warnings

A growing area of exploration is the use of mobile data for anticipatory humanitarian action. As the sector shifts to earlier action, the aim is to identify signals of emerging impacts that can trigger assistance before a disaster fully unfolds. This includes modelling risks in advance and learning from past crises to improve preparedness.[27]

Mobile data can provide early signals of disruption. These include changes in mobility or communication patterns that differ from established baselines. For example, unusual movements away from flood-prone areas following heavy rainfall forecasts or shifts in activity in areas at risk of an approaching cyclone.

Signals are typically combined with external datasets, including weather forecasts, hazard models and socio-economic indicators, to estimate the likely scale and direction of displacement. This can support early planning for evacuation, resource allocation and service delivery. For example, in drought-prone regions of Colombia, models combining rainfall data with mobile-derived mobility patterns were used to forecast migration flows, improving prediction of short-term displacement compared with conventional approaches.[28]

Mobile data can also help to identify those most at risk. Patterns in spending or service use over time can be combined with demographic and environmental information to highlight populations more likely to be affected by shocks, supporting more targeted planning. In some cases, these approaches are used to model how populations might respond under different scenarios.[29] Evidence from past crises suggests that displacement patterns are partly predictable, shaped by existing mobility behaviours and social ties, although accuracy varies depending on the hazard and the availability of contextual information.

Compared with post-disaster mobility monitoring, anticipatory applications are less mature, with signals often difficult to interpret without strong contextual grounding. Interest is nonetheless increasing as humanitarian actors prove that anticipatory approaches can save lives and protect property in emergency situations.

27 Aydoğdu, B. et al. (2025). "Mobile phone data for anticipating displacements: practices, opportunities and challenges." Data & Policy, 7.
28 Isaacman, S. et al. (2018). "Modeling human migration patterns during drought conditions in La Guajira, Colombia". The 1st ACM SIGCAS Conference.
29 Aydoğdu, B. et al. (2025). "Mobile phone data for anticipating displacements: practices, opportunities and challenges". Data & Policy, 7

2.3 Interpreting mobile data in context

Mobile data offers valuable insights into crisis dynamics, but it must be interpreted in context to set realistic expectations for its use in decision-making.

Behavioural signals

While CDRs and related datasets capture device activity and movements, they do not directly measure poverty, food insecurity, health status or overall vulnerability. Humanitarian insights therefore depend on transforming the data by modelling relationships between mobile phone behaviour and socio-economic conditions.[30] For example, changes in mobility or communication patterns may indicate disruption or population stress, but they can also reflect seasonal movement, policy restrictions or network factors.

Population coverage and representativeness

Mobile data offers broad population coverage, particularly in LMICs, but it does not capture all groups equally.[31,32] Ownership rates, phone sharing and varied network coverage influence who appears in mobile data. In many contexts, children, older persons and some groups of women are underrepresented,[33] while multi-SIM ownership can distort measures of activity or mobility.[34] Whether a single MNO captures representative data depends on its market share.[35] These factors underline the importance of triangulating mobile data with other datasets, as this will strengthen interpretation and reveal who may not be captured by the data.

Privacy and analytical balances

Even when anonymised and aggregated, there is still a risk that individuals could be identified, because patterns of movement are often unique. Four data points are enough to re-identify an individual 95% of the time in a dataset of 1.5 million people.[36] Humanitarian applications therefore rely on strict aggregation thresholds and privacy-preserving data processing, with Privacy and Security by Design principles embedded within MNO environments from the outset. These safeguards help to ensure data is used responsibly while shaping the level of analytical granularity possible. This is explored further in chapter 3.

Infrastructure disruptions during crises

Connectivity has fundamentally reshaped both the dynamics of humanitarian crises and the way humanitarian response is delivered.[37] It is often one of the first needs expressed by affected populations, enabling people to seek safety, contact family and access assistance. At the same time, connectivity underpins coordination between responders, supporting communication, logistics and service delivery. However, crises also disrupt the very systems that enable connectivity. Damage to network infrastructure, electricity outages and reduced access to mobile credit can all alter patterns of mobile phone use. These shifts affect the data that can be observed, but they also provide a signal: changes in activity can reflect population movements, behavioural responses and disruptions to critical infrastructure, offering insight into how a crisis is unfolding in near-real time.

Conclusions

Mobile data is most useful in helping humanitarian decision-makers detect change: where people are moving, how behaviours are shifting and where risks may be emerging. Its value is strongest when triangulated with field assessments, official statistics, satellite imagery or environmental data. Leveraged effectively, it can make humanitarian analysis faster and more responsive to changing crisis conditions.

30 Sekara, V. et al. (2023). Are machine learning technologies ready to be used for humanitarian work and development?
31 GSMA. (2025). The State of Mobile Internet Connectivity 2025.
32 GSMA. (2025). The Mobile Economy 2025.
33 GSMA. (2025). The Mobile Gender Gap Report 2025.
34 Milusheva, S. (2025). "Measuring Bias in CDR Mobility Indicators Arising from Multiple SIM Ownership". NetMob 2025.
35 IOM. (2021). Assessing the Use of Call Detail Records (CDR) for Monitoring Mobility and Displacement.
36 de Montjoye, Y-A. et al. (2018). "On the privacy-conscientious use of mobile phone data". Scientific Data, 5.
37 GSMA. (2024). Connectivity in Crisis: The Humanitarian Implications of Connectivity for Crisis-Affected Communities.

3. RESPONSIBLE DATA PRACTICES

Under what conditions can mobile data be used responsibly in humanitarian contexts? While the analytical potential is increasingly well understood, its application depends on governance frameworks that define how data is accessed, analysed and shared. This chapter examines how these conditions can be established.

3.1 Why responsible data sharing matters

Given what makes mobile network data powerful – its scale, granularity and behavioural traceability – using it requires robust safeguards. Conventional anonymisation approaches that have been used for mobile data, such as removing names or phone numbers, can still pose some risks when combined with other data sources.[38]

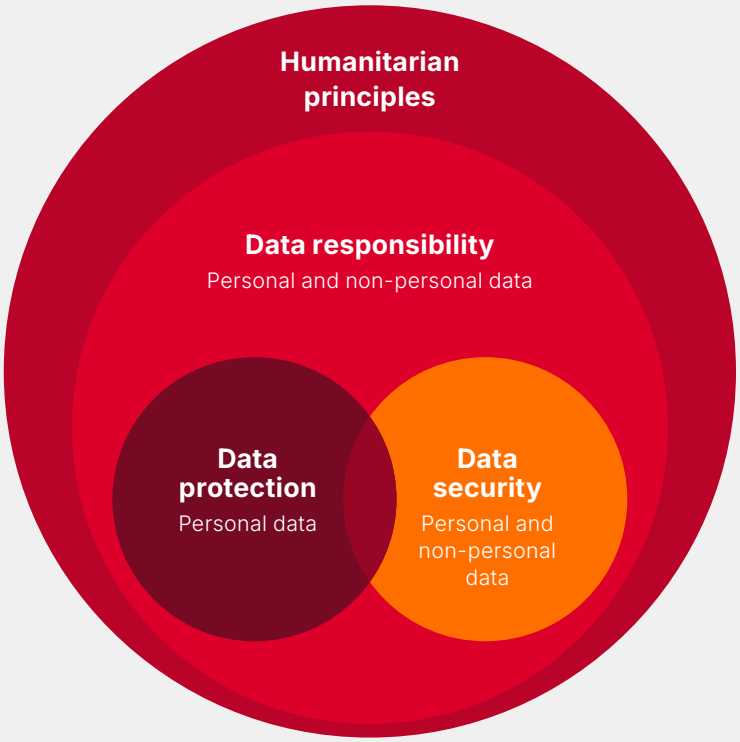
In humanitarian contexts, these risks are amplified. The populations whose data are most relevant – displaced communities, minority groups, individuals in conflict-affected areas – are often those most at risk of harm if data is misused.[39] Mobility patterns can reveal cross-border movements or locations of informal settlements. In conflict settings, real-time movement analysis could carry intelligence value. Even legitimate government access to data can become ethically problematic if it intersects with surveillance, military targeting or asylum determination processes.[40]

Responsible data-sharing frameworks are therefore critical to enabling the use of mobile data in humanitarian contexts. They provide safeguards for affected populations while also reducing legal and reputational risk for MNOs. The humanitarian sector has developed complementary guidance to support responsible data practices. The International Committee of the Red Cross (ICRC), for example, provides sector-specific standards through the ICRC Rules on Personal Data Protection and Handbook on Data Protection in Humanitarian Action, translating general data protection principles into operational guidance for crisis settings.[41,42]

38 Aydoğdu, B. et al.(2022). OPAL system setting and query development.
39 Wood, E.X. (2025). "AI and big data in disaster response: Ethical and practical challenges". Journal of Dynamic Disasters, 1(4).
40 Neiva, L. and Borges, G.M. (2026). "The ethical dimensions of big data in refugee contexts: A scoping review of empirical studies in the social sciences". Social Sciences & Humanities Open, 13.
41 ICRC. (2024). Handbook on data protection in humanitarian action.
42 ICRC. (2024). ICRC Rules on Personal Data Protection.

Figure 2

Responsible use of data in humanitarian action[43]



Data responsibility

The safe, ethical and effective management of personal and non-personal data for operational response, in accordance with established frameworks for personal data protection

Data protection

The systematic application of institutional, technical and physical safeguards that preserve the right to privacy with respect to the processing of personal data

Data security

A set of physical, technological and procedural measures that safeguard the confidentiality, integrity and availability of data and prevent its accidental or intentional, unlawful or otherwise unauthorized loss, destruction, alteration, acquisition, or disclosure

What it is?

The safe, ethical and effective use of data – personal or non-personal – in humanitarian settings, aligned with human rights and humanitarian principles.

Focuses on protecting privacy, ensuring informed consent where possible, and preventing harm to crisis-affected populations.

Why it matters?

In humanitarian contexts, data misuse can have serious consequences: surveillance, targeting, exclusion or exploitation.

Getting it right builds trust, enables safer innovations and ensures digital tools uphold the rights and dignity of the people they aim to help.

Source: Inter-Agency Standing Committee (IASC)

43 IASC. (2023). Data Responsibility in Humanitarian Action.

3.2 Regulatory environments and governance frameworks

Translating responsible data use principles into practice depends on governance frameworks that define how mobile network data can be accessed, processed and shared. This includes considerations such as permissions, data stewardship, access protocols and requirements, as well as rules governing how mobile data is collected, stored, protected and deleted. The legal and regulatory environment shapes what types of mobile data use are feasible and under what conditions.

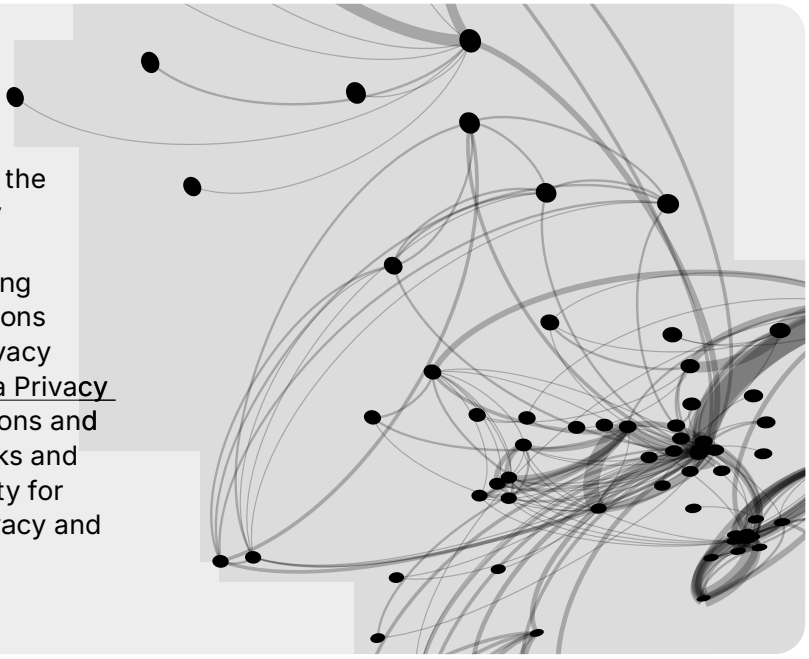
In Europe, the General Data Protection Regulation (GDPR) and ePrivacy Directive establish a high bar for data protection, influencing MNO practice well beyond the European Union.[44] Many multinational operators headquartered in Europe apply GDPR-aligned standards globally, regardless of local regulatory variation. Importantly, anonymised and sufficiently aggregated data (such as those used in humanitarian data projects) fall outside the GDPR's scope if individuals cannot be re-identified.[45] In practice, however, MNOs and their legal teams tend to apply cautious interpretations of these provisions, requiring documented risk assessments and additional safeguards before data can be used.

Beyond the GDPR, national telecommunications regulation introduces further considerations. As one of the most strongly regulated sectors, MNOs must navigate both general data protection frameworks and telco-specific rules governing access to network data.[46] In many jurisdictions, regulatory approval must be required from both data protection authorities and telecommunications regulators, creating a multi-layered approval environment. Regulatory frameworks in some regions, including the EU, are also evolving to create more formalised pathways for public-interest access to private sector data under specific conditions.

44 Murphy, R. (2025). "Mapping the Brussels Effect: The GDPR Goes Global". Centre for European Policy Analysis.
45 Ibid.
46 GSMA. (2026). Regulatory Environment.

GSMA guidance on data privacy frameworks

The GSMA has developed tools to support the design and implementation of data privacy frameworks. The Smart Data Privacy Laws report outlines 14 principles aimed at helping governments, policymakers and organisations to develop effective, future-proof data privacy frameworks. Smart Implementation of Data Privacy Laws provides further insights, global lessons and good practices. Together, these frameworks and lessons can help create regulatory certainty for MNOs while also protecting consumer privacy and enabling commercial innovation.



Regulatory variation across countries also shapes implementation. Some countries have adopted GDPR-inspired frameworks without the institutional capacity to enforce them, while others lack comprehensive data protection legislation but maintain strict telecommunications privacy rules. In some contexts, national security considerations shape decisions about access to network data. As a result, governance arrangements that function in one country cannot always be directly replicated elsewhere, limiting cross-border analysis. During the Ebola outbreak, for example, MNOs in Guinea and Sierra Leone were able to share CDRs for analysis, while more restrictive legal frameworks prevented similar access in neighbouring Liberia.[47]

Government endorsement can play an important role in enabling data-sharing initiatives. Where national statistics offices or relevant ministries formally support a project, MNOs have clearer authorisation boundaries. Where such endorsement is absent, legal ambiguity often increases institutional hesitation. In practice, a circular dependency often emerges: MNOs need clear authorisation and viable models, while donors require evidence of access and scalability. Without early institutional backing, partnerships struggle to form. From one project reviewed, a proposed data-sharing arrangement stalled when concerns between national and regional authorities created uncertainty over which entity could approve the partnership.

Establishing governance arrangements requires extensive coordination. Negotiating agreements, defining roles and setting up oversight mechanisms can take 12 to 18 months – sometimes longer than the time required for technical implementation. This governance-heavy reality explains why attempts to establish data sharing during an active crisis rarely succeed, as partners attempt to compress months of coordination into days. It also highlights why more recent initiatives have focused on building governance frameworks in advance, enabling faster mobilisation when data is needed.

47 Cinnamon, J., Jones, S.K. and Adger, W.N. (2016). "Evidence and future potential of mobile phone data for disease disaster management". Geoforum.

Case study
Institutionalising mobile phone data for policy across LMICs

Efforts to integrate mobile phone data into official statistics and policy have been underway for more than a decade, led by international institutions, national statistics offices and research initiatives. The **Global Data Facility – Mobile Phone Data (GDF-MPD) programme**, launched in 2024, is a multi-country initiative led by the World Bank in partnership with the International Telecommunication Union (ITU), with funding from the Government of Spain. The programme supports governments to integrate anonymised mobile phone data into national data systems to improve official statistics and policy insights in areas such as transport, public health, migration and disaster response.

The programme aims to support the integration of mobile phone data into the national data systems of **30 countries by 2030** and it has already gained momentum. Within its first year, **24 countries joined** and **six initiatives were supported to formalise public-private data-sharing partnerships** – suggesting it could exceed its original target. For example, **Kazakhstan** established a multi-operator data pipeline within less than a year, while countries such as **Brazil, The Gambia and Haiti** are exploring how anonymised mobility data can inform policy around migration, transport, public health and disaster response.

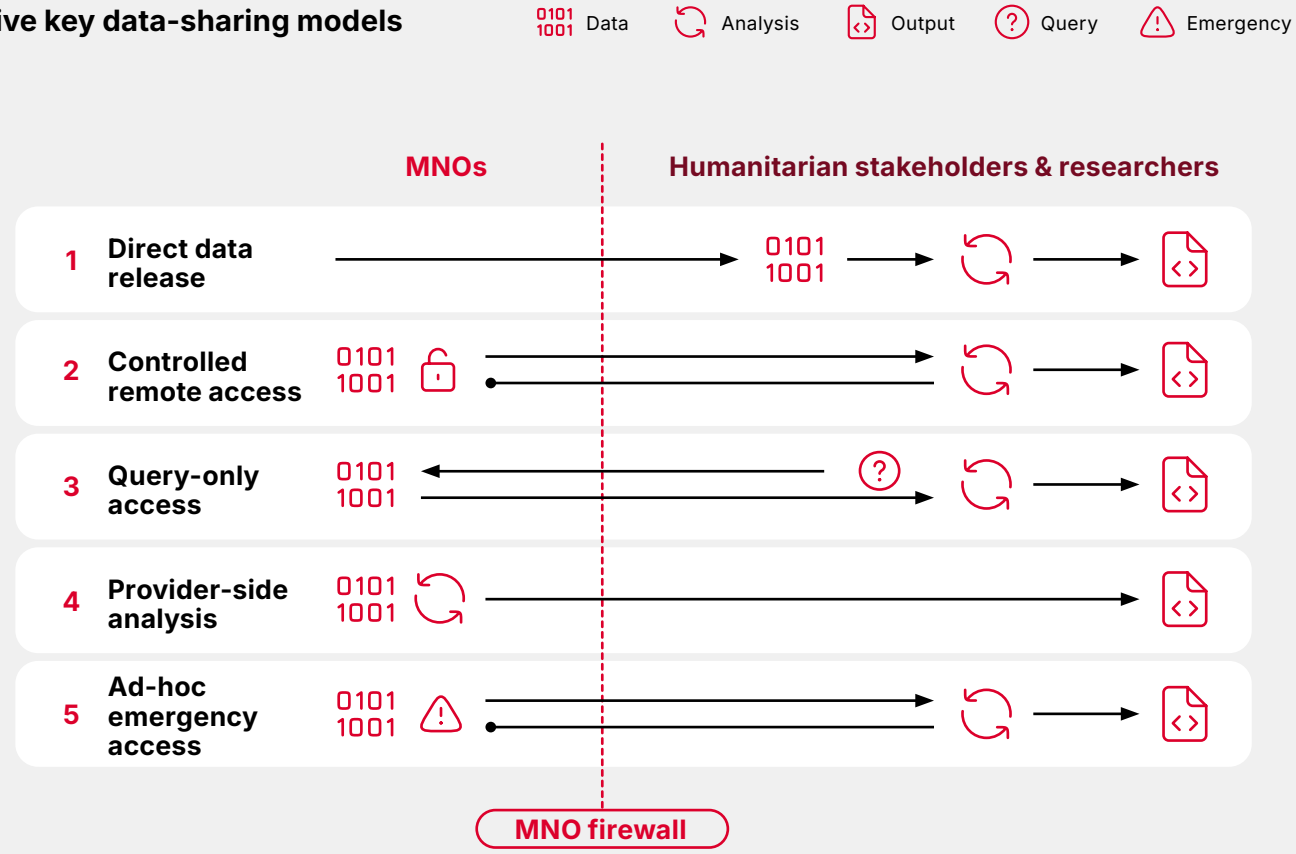
Importantly, the **programme's convenings bring together a broad set of actors needed for these projects to succeed:** national statistics offices, ICT ministries, telecoms regulators, data protection authorities and MNOs. This multi-stakeholder approach is essential for building the partnerships, governance frameworks and technical capacity needed to use mobile phone data responsibly at national scale. The GDF-MPD is also helping to promote **global standards, public goods and best practices** for the responsible use of mobile phone data.

Although primarily focused on statistical modernisation and policymaking, **these efforts are well placed to benefit the humanitarian sector**. As countries work to establish durable governance frameworks, operational data pipelines and the capacities to manage and analyse the data in LMICs, mobile data insights can lead directly to improved data ecosystems to support disaster preparedness and crisis response.

3.3 Data-sharing models

Within the governance parameters described above, different data-sharing models have emerged that allow humanitarian actors or governments to generate insights from mobile network data while preserving privacy. Five broad approaches were identified by the research. While not exhaustive, these models provide a framework for understanding how different design choices shape trade-offs between analytical flexibility, privacy protection and MNO exposure.

Figure 3
Five key data-sharing models



	Model	Where analysis happens	MNO data exposure	Typical use
1	**Direct data release**	External partner	Highest	Research and method development
2	**Controlled remote access**	Secure operator environment	Medium	Long-term analytical partnerships
3	**Query-only access**	Operator-controlled system	Low	Standardised indicators and monitoring
4	**Provider-side analysis**	Operator completes analysis internally	Very low	Privacy-sensitive operational analysis
5	**Ad-hoc emergency access**	Varies	Variable	Acute crisis response

1. Direct data release

In this model, datasets are processed, aggregated or pseudonymised within the MNO environment and then transferred to external partners under legal agreements. While this approach provides the greatest analytical flexibility, it also creates the highest exposure because data leaves MNO control. For this reason, direct release is now rarely used – typically limited to trusted academic collaborations with proven data privacy and processing capabilities.

2. Controlled remote access

Controlled access models allow external analysts to work with data within secure MNO environments. Data remains on MNO infrastructure, with access governed through authentication, monitoring and contractual controls. This enables relatively flexible analysis while maintaining oversight.

Tools such as Flowminder's FlowKit exemplify this approach, allowing indicators to be computed directly on MNO servers.[48] These models require investment in secure environments, access management and technical integration, making them more suited to sustained partnerships.

3. Query-only access

Query-based systems – often described as "algorithms to data" approaches – allow users to submit predefined analytical queries without accessing underlying datasets. Instead, systems return aggregated outputs, such as estimates of population movement between locations. For example, a humanitarian organisation might ask, "How many people moved from Region A to Region B in the past week?" and receive the answer "5,000" without ever seeing individual records.

Initiatives such as the 'Multi-MNO project' led by Eurostat from 2023-25, explored an open-source, standardised methodology for the processing of MNO data for official statistics.[49] Queries are executed within MNO infrastructure, with outputs subject to controls such as minimum group sizes, coarsening or differential privacy. All queries and parameters can be logged and audited.

This approach significantly reduces exposure while enabling repeatable, standardised insights. It requires upfront investment in platform development, governance structures and long-term institutional support.

4. Provider-side analysis

In provider-side models, analysis is conducted entirely within the MNO environment. External partners provide methodological specifications or code, which MNO teams execute internally before sharing aggregated outputs. This approach offers strong privacy protection, as raw data never leaves operator control. It can be effective for operational use cases where predefined indicators are sufficient, but it depends on sustained analytical capacity within the MNO and limits external flexibility.

5. Ad-hoc emergency access

In some crises, data access has been granted through temporary or expedited arrangements. Standard governance processes may be shortened and access is typically time-bound. While this can enable rapid analysis in acute emergencies, it rarely leads to sustained use. Without pre-existing agreements, regulatory approvals and technical readiness, data access is difficult to establish within operationally meaningful time frames. This model was more common in earlier initiatives and is increasingly being replaced by pre-positioned systems.

48 Flowminder: "FlowKit, our open-source software for the secure processing & analysis of mobile operator data".
49 Learn more about the Multi-MNO project and explore the software codes.

3.4 Safeguards in practice

Responsible mobile data use in humanitarian contexts relies on multiple layers of protection designed to reduce privacy risk while enabling analytical use. These safeguards combine technical measures, operational controls and ethical oversight.

1. Technical safeguards

Technical protection frameworks identified by the research combine several approaches to reduce the risk that individuals can be identified from the data. Pseudonymisation removes direct identifiers like phone numbers within secure operator systems.[50] Aggregation thresholds prevent results from being reported where only a very small number of people are represented – for example, removing outputs that include fewer than 15 individuals. These layered approaches reflect "privacy by design", where protection is built into data processing from the outset.[51]

More advanced privacy-preserving techniques have also been developed in recent years. For example, differential privacy is a mathematical approach to data protection that limits what can be learned about any individual from a dataset, even when additional information is available. It does this by introducing carefully calibrated statistical noise into analytical results, reducing the likelihood that any individual could be identified from the data.[52] Unlike traditional anonymisation methods, which can fail when datasets are linked with external information, differential privacy provides more quantifiable guarantees about disclosure risk. For example, researchers assessing this approach in the context of hypothetical disaster scenarios in Afghanistan and Rwanda found it was one way to provide strong privacy guarantees while still allowing policymakers to make informed decisions.[53]

50 GSMA. (2019). Smart Data Privacy Laws Achieving the Right Outcomes for the Digital Age.
51 GSMA. (2016). Mobile Privacy Principles.
52 Savi, M.K. et al. (2023). "A standardised differential privacy framework for epidemiological modelling with mobile phone data". PLoS Digital Health, 2(10).
53 Kohli, N., Aiken, E. and Blumenstock, J. (2024). "Privacy guarantees for personal mobility data in humanitarian response". Scientific Reports, 14.

2. Operational safeguards

Technical protections are complemented by operational controls that govern how data is accessed and used. Clear rules agreed between a humanitarian organisation and MNO define the purpose of the analysis and ensure that only the information needed for that purpose is processed. Access controls also limit who can work with the data in each organisation, while monitoring systems record when data is accessed or analysed. Set policies define how long information can be retained and when it must be deleted. External oversight, such as ethics review boards or regulatory supervision, can provide additional accountability.

3. Considerations for humanitarian contexts

The humanitarian sector continues to navigate the responsible use of large-scale behavioural data in crisis settings. While technical and operational safeguards are increasingly well established, their application requires additional scrutiny given the risks it can pose to affected populations.[54]

Evidence shows that populations affected by crisis may have limited ability to meaningfully consent to the use of their data.[55] Even where consent mechanisms exist, declining may not be a realistic option if access to assistance depends on participation. For this reason, responsible mobile data use in humanitarian contexts increasingly emphasises institutional accountability as well as individual consent. Clear governance arrangements, strict limits on how data can be used and independent oversight mechanisms must play a central role in protecting affected populations.

Conclusions

Responsible mobile data use in humanitarian contexts depends on governance frameworks that enable analysis while managing privacy and regulatory risk. Because MNOs control access to the underlying data, their internal policies, legal interpretations and risk assessments shape how data-sharing initiatives develop. As governance approaches continue to mature, these frameworks are helping create clearer pathways for partnerships between MNOs and humanitarian actors.

54 ICRC. (2025). 10 Years of Data Protection in Humanitarian Action.
55 IASC. (2021). Data Responsibility in Humanitarian Action.

4. MOBILE INDUSTRY PERSPECTIVES

Mobile network operators have a long history of supporting humanitarian data initiatives, particularly during crises and public health emergencies. The central question is therefore not whether MNOs are willing to engage, but under what conditions collaboration becomes feasible and sustainable.

This chapter examines how MNOs assess participation in data-sharing partnerships. Drawing on consultations with mobile industry stakeholders and partners implementing data initiatives, it explores the motivations that enable engagement, constraints shaping decision-making and the conditions that have supported longer-term partnerships.

Almost all initiatives reviewed by the research originated in corporate social responsibility (CSR) or foundation teams rather than commercial business units. CSR-led engagement often provides an effective entry point, as sustainability or public affairs teams can authorise short-term support quickly. However, CSR rarely supports sustained investment in systems or personnel, creating a funding ceiling.

The depth and duration of engagement can vary by humanitarian context. Evidence from past deployments shows that in the early years of these initiatives, rapid-onset disasters and public health emergencies could trigger short-term MNO participation, where urgency temporarily outweighs perceived risk.[56] By contrast, conflict or protracted displacement contexts require sustained engagement and involve greater political and operational exposure, making deeper collaboration harder to justify internally. Academic partnerships typically present lower risk for MNOs, as they often focus on retrospective analysis and operate under more established research governance frameworks.

Across the initiatives reviewed, engagement is more likely to be sustained when projects align across multiple business units, including executive leadership, legal, technical and commercial teams. Participation rarely advances on a single motivation. Engagement becomes more durable when reputational value, manageable risk and a clearly defined operational requests align with incentives and internal capacities.

4.2 Financing and incentives: how projects are funded

Supporting mobile data initiatives requires MNOs to allocate operational resources. Engineering time, data infrastructure, compliance oversight and senior review all represent costs within commercial organisations. The structure of financing therefore plays a crucial role in determining whether engagement remains short term or becomes sustained. As discussed in the previous section, many humanitarian mobile data projects are initially supported through CSR or foundation budgets, which provides a practical entry point for early experimentation. However, CSR funding rarely supports the ongoing infrastructure or staff time required to sustain data partnerships. Where projects evolve beyond foundation budgets, participation is more likely to become embedded within ongoing operations.

The structure of humanitarian funding also influences whether data partnerships can be sustained. Donor-funded pilots typically support time-bound experimentation rather than repeatable service provision which, from an MNO perspective, does not easily justify allocating scarce technical and compliance capacity. As a result, the "market" for humanitarian data is often a single shared output rather than a model based on multiple paying users.

This tension is illustrated by a cost-sharing model piloted in Haiti to sustain a mobile data pipeline. Maintenance costs were structured so that multiple humanitarian organisations could contribute. For example, if the pipeline costs $30,000 to run, the cost per organisation becomes relatively low when shared. In practice, however, the model proved difficult to sustain, as donors were generally more inclined to fund one-off contributions and make outputs openly available to all actors.

Beyond financing structures, MNO participation is also shaped by the regulatory and political environments in which data partnerships operate.

56 Milusheva, S. et al. (2021). "Challenges and opportunities in accessing mobile phone data for COVID-19 response in developing countries". Data & Policy.

Monetisation of data is rare, but some adjacent commercial incentives exist

Monetisation of humanitarian data use remains uncommon. Where commercial incentives exist for mobile data projects, they tend to arise from existing mobile services rather than the sale of raw data.

Examples include:

- **Mobile money transactions:** Digital cash transfer programmes can increase transaction volumes where mobile money services are used to distribute humanitarian assistance.
- **Expanded user base:** In protracted displacement contexts, expanded services may increase uptake of services among affected populations.
- **Analytical services:** Some MNOs already provide mobility insights products to commercial clients, such as transport planners, retailers or tourism authorities. Humanitarian data projects could build on similar analytical capabilities, using established tools and data processing pipelines.

Mobile money provides one of the clearest illustrations of how humanitarian engagement can align with MNO business models. Where regulatory conditions and agent networks are supportive, digital cash transfers can generate operational value for both humanitarian actors and MNOs. More broadly, incentives tend to be strongest where humanitarian initiatives reinforce existing service lines rather than requiring entirely new commercial models.

4.3 Operating environment: regulatory and political contexts

> "Data access depends on regulation, the sensitive nature of the data and the privacy risk associated. For example, during the COVID crisis we were not allowed to use the raw data. We had to use indicators coming from our commercial service provision because the regulator didn't allow us to have access to the raw data and properly build some more appropriate indicators to manage and to study the epidemic. So, the regulation point is very important." **– MNO**

As outlined in chapter 3, MNOs operate within telecommunications and data protection frameworks designed for commercial activity. Humanitarian data projects must therefore align within national regulatory systems that define how network data can be accessed, processed and shared.

Discussions highlighted that government endorsement can play a decisive role in enabling collaboration. Where regulators or public authorities provide clear authorisation, MNOs have greater confidence to engage. In the absence of such guidance, MNOs can lean on more cautious interpretations of regulatory requirements. Regulation also shapes how services are delivered. For example, mobile money-based humanitarian cash assistance may require temporary adjustments to SIM registration rules, agent liquidity and KYC requirements to function effectively during crises.

MNOs must also consider reputational exposure. MNOs manage large volumes of customer data as part of their core business, which creates both capability and responsibility. Even when mobility indicators are aggregated and privacy safeguards are applied, public perception can influence how data use is interpreted. Public debate on the use of mobility data during the COVID-19 pandemic illustrated how such perceptions can shape corporate risk assessments, as a lack of public trust can stand in the way of developing a robust approach.[57]

> "Even when the law permits it, MNOs can hold back because of reputational exposure – reputation loss of even a fraction of market share translates into millions in lost revenue." **– MNO**

These external risk considerations, combined with commercial sensitivities and internal organisational dynamics, influence whether data partnerships move forward.

57 Oliver, N. et al. (2020). "Mobile phone data for informing public health actions across the COVID-19 pandemic life cycle". Science Advances, 6(23).

Why MNOs operate under different data-sharing conditions than technology platforms

In recent years, several technology companies have made aggregated datasets and analytical tools to support humanitarian efforts. For example, Google and Meta have made mobility insights, crisis mapping tools and predictive data products available to humanitarian organisations and public authorities.[58,59] The mobile industry, however, operates under a different structural and regulatory environment.

MNOs navigate:

- Country-by-country regulatory approval processes
- Oversight from national telecoms regulators
- Data protection frameworks that vary across jurisdictions
- Physical network infrastructure tied to national markets
- Commercial sensitivities around network intelligence and market data

Technology platforms, by contrast, can:

- Establish company-wide data-sharing policies at a global level
- Provide pre-aggregated data products designed for external use
- Deploy standardised APIs enabling consistent access for partners
- Draw on centralised legal teams specialising in data partnerships
- Make partnership decisions on timelines of weeks to months

These structural differences mean that data-sharing partnerships in the mobile sector typically require more rigorous governance arrangements and longer negotiation processes.

4.4 Commercial sensitivities

Beyond regulatory considerations, mobile network data represents a commercially sensitive asset for MNOs. CDRs and related mobile metadata can reveal information about network performance, coverage and customer behaviour. Even aggregated outputs may raise concerns about competitive exposure in tightly contested markets.

In many countries, there is no single MNO providing full population coverage. Data analysis for humanitarian purposes may therefore require collaboration with multiple MNOs, which introduces additional coordination challenges and commercial considerations. Even when data is aggregated, MNOs must consider whether shared outputs could reveal commercially relevant information about network usage or market share. In some cases, competitive dynamics can encourage participation, for example, where MNOs seek to demonstrate network reach or social contribution. In practice, engagement depends on whether humanitarian analysis can be conducted without compromising an MNO's commercial position.

As a result, MNOs often favour models that allow them to retain control over underlying data while sharing aggregated insights. Provider-side analysis, controlled access environments and query-based systems can help reduce perceived commercial exposure while still enabling humanitarian analysis.

58 See, for example: Meta's AI for Good programme.
59 See, for example: Google's Crisis Response.

4.5 Internal capacity and organisational dynamics

Humanitarian data initiatives typically involve coordination across multiple internal teams, including legal, security, technical, policy and CSR functions. Each operates under a different mandate and has a different tolerance for risk. Securing approval from one unit does not automatically translate into organisation-wide commitment, and projects may need additional coordination as they move through internal review processes. In some cases, decision-making is further influenced by the relationship between group headquarters and national operating companies. Approval secured at the country level may still require endorsement from regional or global leadership when projects involve sensitive data-sharing arrangements.

Even where senior leadership is supportive, delivery hinges on operational capacity. In several cases reviewed, projects relied on a small number of specialised staff whose time was already fully allocated. Without dedicated resourcing, participation can remain informal and difficult to scale.

Infrastructure constraints can also shape whether a data-sharing partnership is feasible. In some contexts, legal requirements mandate local data processing, limiting the use of standard cloud-based analytical environments and increasing operational overhead.

These internal dynamics mean that willingness to engage does not automatically translate into delivery at scale. Sustained participation typically requires executive sponsorship, clear budget allocation and alignment across business units.

4.6 Aligning mobile and humanitarian approaches

Across these dimensions, a consistent pattern emerges: humanitarian and MNO operating models are structured differently but can align under the right conditions. Humanitarian actors typically approach data as a public good and rely on time-bound project funding, while MNOs manage data as a regulated commercial asset within competitive markets and longer planning horizons.

Table 2

Data initiatives: humanitarian vs mobile industry approaches

Humanitarian sector	Mobile industry
Data should be a public good	Data is a strategic, commercial asset
Shorter, donor-funded life cycles	Longer investment time frames
Crisis-driven	Risk-managed operations

These differences do not prevent collaboration but do shape the form it takes. For MNOs, participation depends on whether humanitarian initiatives work within existing organisational incentives, risk management frameworks and operational capacity. While many MNOs express interest in supporting humanitarian data use, participation ultimately depends on whether initiatives can fit within these parameters.

These dynamics help to explain why mobile data collaborations forged through pilots or in crisis-specific contexts have struggled to transition into continued operational use. Initiatives that have developed into longer-term partnerships provide valuable insight into the conditions that support ongoing collaboration.

The following chapter presents case studies of mobile data collaborations that have stood the test of time and the operational arrangements that have sustained them.

5. EXPLORING MOBILE DATA PARTNERSHIPS

The following case studies explore how long-standing partnerships have navigated the challenges highlighted in previous sections. They were chosen to capture diverse geographies (Latin America, West Africa, Southeast Asia), different types of partners and a range of use cases. They also feature a variety of regulatory and political contexts and factors that have contributed to the longevity of the partnerships.

Case study 1:
Telefónica, Chile

In Chile, a decade-long collaboration between **Telefónica Chile** and **Universidad del Desarrollo** demonstrates how mobile network data can support public interest research and policy analysis when strong institutional relationships and governance frameworks are in place.

Telefónica provides mobile phone data to academic researchers – approximately 170 million transactions per day, with only a one-day delay. The dataset contains approximately 1.2 trillion records from 2016 to the present.

Case study 2:
Telecel, Ghana

In Ghana, a long-standing partnership between **Telecel Ghana, the Ghana Statistical Service (GSS) and Flowminder** has demonstrated how anonymised mobile network data can be integrated in national statistical systems and operational decision-making.

Since 2018, the collaboration has produced indicators of population distribution and mobility that complement official statistics and have supported applications ranging from health planning to flood disaster preparedness.

Case study 3:
Globe, the Philippines

Globe Telecom became the first MNO to join the United Nations **DISHA** coalition, a multi-partner initiative led by **UN Global Pulse** bringing together humanitarian organisations, private-sector partners and research institutions to accelerate the responsible use of data and AI for disaster response.

Through an “always-on” analytical platform that leverages CDR data layered with national census and environmental data, the model allows mobility insights to be generated continuously and made available immediately when crises occur. To date, the solution has supported the response to six major emergencies affecting more than 5.6 million people in 2025.

Case study 1: Telefónica Chile

Overview of the partnership

The collaboration between Telefónica and Universidad del Desarrollo began in 2016 with support from Chile's economic development agency, the Corporation for Industrial Development (CORFO). The funding helped to establish Telefónica's research and development capacity while creating a formal partnership with academic researchers.

Over time, this collaboration evolved into a long-term research programme leveraging anonymised mobile data to generate insights on population mobility and social dynamics.

Researchers analyse large-scale datasets derived from Telefónica's network, covering millions of network interactions per day. The dataset spans several years of historical information, enabling both real-time and retrospective analysis of population movements.

The partnership combines complementary expertise:

- **Telefónica** provides access to Chilean mobile data and technical knowledge of network infrastructure.
- **Universidad del Desarrollo** researchers contribute statistical modelling and data science capabilities.

Key use cases

The collaboration has produced insights across several public policy and disaster-related domains.

Pandemic response

During the COVID-19 pandemic, researchers developed a national mobility index derived from mobile network activity.[60] The index was published twice weekly and used by policymakers to monitor changes in population movement during quarantine measures. This work was widely recognised by government authorities and provided clear evidence of how mobile data can support immediate monitoring of behavioural responses during public health emergencies.[61]

Mobility and gender research

The partnership has produced academic research analysing gender differences in mobility patterns using a dataset of around 12 billion calls between antennas with gender information. One study examined gender gaps in urban mobility in Santiago, providing insights for policymakers and urban planners.[62]

Disaster analysis

Following the 2024 Valparaíso wildfires, researchers analysed population movements during and after the event to understand evacuation patterns and displacement dynamics.[63] Analysis showed that initial SMS alerts caused rapid responses while subsequent alerts had diminished effects, and that lower socio-economic groups evacuated more slowly and took longer to return to normal.[64] Although the papers were published about a year after the event, the analysis itself was completed within days of the disaster, demonstrating the ability of mobile data to provide rapid insight into emergency events and inform understanding of potential evacuation behaviours in future crises.

Ongoing projects

The research programme is currently exploring additional use cases, including **modelling dengue transmission pathways** and analysing mobility patterns related to **tsunami** and **volcanic activity risks.**

Technical details

Researchers receive XDRs derived from network control-plane data. These records include antenna-level location data aggregated at approximately 30-minute intervals, with a one-day delay.

Researchers in Chile have conducted validation exercises comparing mobile network data with other data sources. For example, the wildfire mobility analysis compared antenna-based population movement indicators with mobility data derived from Meta's disaster response datasets. Despite differences in underlying technologies (GPS versus antenna-based positioning), the datasets showed strong correlation.[65]

Comparisons with census data also show strong alignment, with approximately 90% correlation at the local area level. These exercises confirm that the aggregated mobile network data received by Telefónica, which is within the top three mobile players in the country with about 5.4 million customers and a market share of 23%, provide reliable insights into population distribution and movement patterns.[66]

60 Pappalardo, L. et al. (2023). "A dataset to assess mobility changes in Chile following local quarantines". Scientific Data, 10.
61 De Alarcon, P. et al. (2021). "The contribution of telco data to fight the COVID-19 pandemic: Experience of Telefonica throughout its footprint". Data & Policy.
62 Gauvin, L. et al. (2020). "Gender gaps in urban mobility". Humanities and Social Sciences Communications, 7.
63 Naushirvanov, T. et al. (2024). Evacuation patterns and socioeconomic stratification in the context of wildfires in Chile.
64 Elejalde, E. et al. (2025). Behavioral response to mobile phone evacuation alerts.
65 Naushirvanov, T. et al. (2024). Evacuation patterns and socioeconomic stratification in the context of wildfires in Chile.
66 Ministerio de Transportes y Telecomunicaciones. (2026). Sector Telecomunicaciones Cierre 2025

Responsible data use and regulatory environment

Legal and ethical review processes govern the use of the data, ensuring privacy safeguards and responsible practices. The collaboration incorporates several safeguards to protect customer privacy:

- Data analysed by the university researchers consists of aggregated network activity records, with identifiers hashed and location information represented at the antenna level rather than precise geographic coordinates.[67]
- Aggregation of data over longer time intervals further reduces the risk of individual identification.
- Importantly, raw telecommunications data remains under the control of the MNO.
- While Telefónica is a Spanish company subject to GDPR, Chile has a data transparency law that is more restrictive than GDPR in certain aspects, meaning compliance with Chilean law ensures GDPR compliance.
- Legal and ethics approvals are required before new research projects can proceed.

Impact and future potential

The Telefónica-Universidad del Desarrollo collaboration has had several positive impacts:

- It produced policy insights, particularly during the COVID-19 pandemic when mobility indicators helped inform national decision-making.
- The partnership has also contributed to high-profile research outputs, including peer-reviewed studies examining mobility dynamics in disaster contexts.
- Finally, the collaboration has strengthened relationships between the telecoms sector, government and the research community, demonstrating how mobile network data can contribute to public interest research.

For Telefónica, the initiative has had broader benefits for its brand reputation. The Covid-era mobility tracking work in Chile had an equivalent commercial value of approximately $12.5 million in publicity. It has also helped the company's positioning in subsequent government engagements.

This collaboration illustrates how academic partnerships can provide a stable pathway for mobile data analysis to support humanitarian outcomes. By combining MNO-hosted data with university-based analytical capacity, the Telefónica-Universidad del Desarrollo model has enabled continued research while maintaining strong privacy safeguards within a particularly strict regulatory environment.

The partnership is notable because of its longevity, contributing to national policy decisions for more than 10 years. The project has since expanded to Colombia and Ecuador, with aspirations to scale more broadly across Latin America.

67 A hash function converts data of any size into a fixed-length string that acts as a digital fingerprint. In this context, hashing transforms personal details such as a phone number into a scrambled string using a mathematical algorithm, so it can no longer be directly linked to an individual.

Case study 2:
Telecel, Ghana

Overview of the partnership

The Data for Good partnership between Telecel Ghana, the Ghana Statistical Service (GSS) and Flowminder was established in 2018. The collaboration focuses on analysing pseudonymised aggregated CDR data to generate mobility indicators and dynamic population estimates that complement traditional statistical sources in the country.

Each partner has a distinct role:

- **Telecel Ghana** provides pseudonymised mobile network data.
- **Flowminder** acts as the technical intermediary, supporting data preparation, analytics and the development of data pipelines.
- **GSS** serves as the primary institutional partner and end user, integrating outputs into national statistical analysis and planning processes.

This structure reflects a government-rooted collaboration model, where mobile network data becomes part of official statistical production rather than used solely for one-off analytical projects.

Technical details

The partnership uses aggregated mobile network activity data from Telecel to generate indicators of population mobility and distribution across Ghana. These indicators are produced through a structured data processing pipeline managed by Flowminder, designed to ensure both privacy protection and statistical robustness.

Because the mobile network data may not fully represent the entire population, the analysis combines CDR-derived indicators with census and survey datasets. Population estimates are adjusted using sources such as the Annual Household Income and Expenditure Survey conducted in 2022.[68] These adjustments correct for biases associated with subscriber demographics and mobile phone ownership patterns in Ghana. This approach allows the data from Telecel to complement official statistics while ensuring that resulting indicators are representative of the broader population.

Key use cases

The partnership produces recurring analytical indicators that provide insights into national population mobility and distribution. These indicators support a range of public policy and humanitarian applications:

Urban-rural mobility analysis

Monthly analyses of population movements between rural areas, towns and major cities have been produced since 2022.[69] This can support policy discussions on urbanisation, infrastructure planning, housing development and healthcare service delivery.

Conflict-related displacement monitoring

Mobile data has also been used to analyse population displacement linked to conflict events in Ghana. For example, mobility estimates derived from Telecel's CDR data helped to monitor displacement patterns following violence in the Sawla-Tuna-Kalba district and longer-term displacement dynamics in Bawku in 2025.[70] These insights were positioned to complement field-based data used by Ghana's National Disaster Management Organisation (NADMO).

Disaster preparedness and flood risks

The collaboration has also used mobility analysis in response to natural hazards in Ghana. By examining population density patterns at different times of the day and week, analysts can identify when large numbers of people are present in high-risk areas. When combined with hazard data, these insights help authorities better understand potential disaster impacts.

The use of Telecel's data and dynamic risk mapping in Ghana has enabled NADMO to identify which populations are most at risk and where help would be needed. For example, in October 2023, southeastern Ghana experienced widespread flooding, displacing thousands of people across multiple communities.[71] CDR data was used to analyse changes in subscriber locations to estimate displacement patterns resulting from the floods, comparing data patterns before and after the flooding. The insights were triangulated with information gathered by NADMO on the ground and revealed unexpected locations experiencing high numbers of movement that informed local responders' efforts.

Health service planning

The collaboration has supported the Ghana Health Service (GHS) to understand the potential for incorporating mobility data in planning and service delivery. By estimating how many people are present in an area in near-real time, the data strengthens core public health metrics, improves understanding of disease spread and helps target the allocation of resources and services more effectively.[72]

68 Flowminder. (2025). Urban-Rural Population Mobility Patterns in Ghana: 2022-2024.
69 Ibid.
70 Flowminder. (2 March 2026). Conflict-derived displacements in Ghana: Focus on Sawla-Tuna-Kalba and Bawku Municipal districts (October 2025).
71 Data to Policy Navigator. (2024). Using mobile operator data to enhance planning and response to natural disasters.
72 Flowminder: "Producing a dynamic denominator for health purposes in Ghana".

Responsible data use

The partnership incorporates strong safeguards to ensure responsible data use:

- Telecel Ghana provides pseudonymised CDR data, meaning no directly identifiable personal information such as subscriber telephone numbers, customer information or demographics is shared with Flowminder, government partners or other organisations.
- All analytical outputs from the partnership are produced through aggregated indicators. Any aggregates containing fewer than 15 subscribers are redacted, thus reducing the risk of reverse engineering the identity of any individual subscriber.
- Data processing takes place on a secure server located within Telecel Ghana's infrastructure, behind its firewall.

This approach aligns with international data protection standards and GDPR principles.

Impact and institutional integration

One of the distinct features of the Ghana partnership is its integration within the GSS. By embedding mobile data analysis within a national statistics office, the collaboration moves beyond short-term pilot projects and enables mobile data insights to contribute to regular national statistical production for policy planning and implementation.

Capacity building and stakeholder training have been a core element of the project, ensuring it is sustainable over the long term.

- Flowminder acts as the technical and capacity-strengthening lead, including providing support to Telecel, GSS and other organisations within the data ecosystem.
- GSS, as the nationally mandated authority for official statistics, plays a central role in integrating the data in the country's data ecosystem and championing its use by other national actors.
- Ghana has shared lessons learned from its projects with other NSOs in neighbouring countries (e.g. Nigeria, Somalia, etc) to support exploration in other markets.

The collaboration shows how data partnerships rooted in national statistical offices and facilitated by technical providers and MNOs can enable mobile data to become a sustainable part of a country's data ecosystem.

Case study 3:
Globe, Philippines

Overview of the partnership

The Philippines is one of the most disaster-prone countries in the world.[73] Around 74% of the population is exposed to hazards including floods, cyclones, earthquakes, tsunamis and landslides, while an average of 22 typhoons enter the Philippine Area of Responsibility (PAR) each year, roughly half of which make landfall.[74] These events regularly trigger large-scale displacement as people evacuate to shelters or relocate temporarily to neighbouring regions.

The collaboration between Globe Telecom and the UN Data Insights for Social and Humanitarian Action (DISHA) initiative emerged from broader efforts to apply data analytics to disaster preparedness and response in the Philippines.[75] The partnership began in 2023 and expanded through a pro bono agreement between Globe and UN Global Pulse, the United Nations Secretary-General's Innovation Lab.[76]

The collaboration reflects shared motivations. Humanitarian organisations seek faster insights into population movements during crises, particularly in the Philippines given its exposure to rapid onset hazards. For Globe, the collaboration aligns with its sustainability commitments and demonstrates how telecoms data can support disaster preparedness and response in a country frequently affected by climate-related hazards.

73 World Bank. (2023). Disaster Risk Management in the Philippines.
74 Chong, R.M.B. et al. (2025). "Evolving disaster resilience in the Philippines: Insights from the 2021 and 2023 World Risk Poll on socio-economic, regional, and systemic factors". International Journal of Disaster Risk Reduction, 121.
75 Learn more about DISHA.
76 Globe. (2025). "Globe is First Telco to Join UN-Led DISHA Initiative for Disaster Response".

The DISHA solution

At the centre of the partnership is an innovative socio-economic mapping platform developed through a collaboration between DISHA partners, including QuantumBlack, McKinsey's AI arm.

The platform integrates several data sources, including:

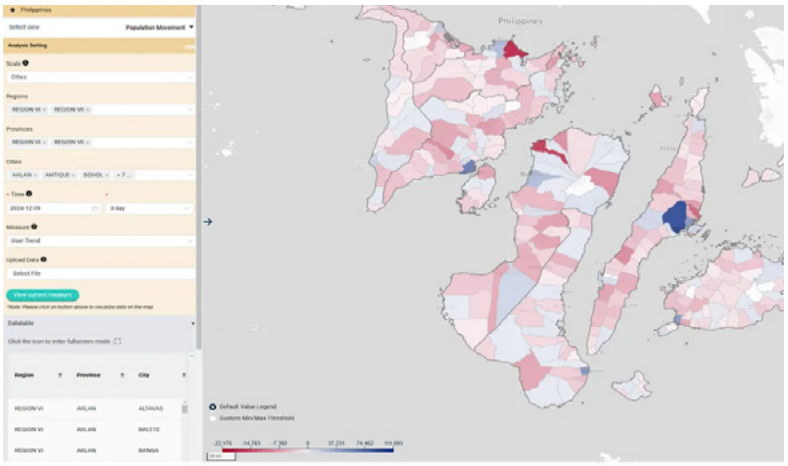
- Aggregated data insights derived from Globe's CDRs
- Government census data from the Philippine Statistics Authority
- Static reference datasets such as the locations of evacuation centres

These inputs are used to produce two primary analytical outputs described below. In addition, the DISHA platform allows humanitarian users to upload their own dataset to be overlayed with insights derived from Globe data, creating custom maps private to their organisation only.

Together, these dashboards aim to provide a more comprehensive operational picture during disaster response by combining population movement data with vulnerability indicators.

1. Population movement insights

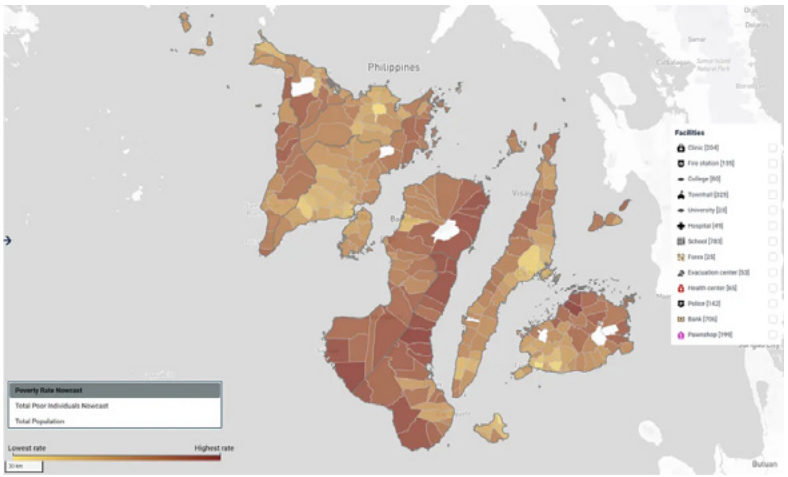
The platform generates dynamic heatmaps showing abnormal population inflows and outflows across geographic areas following a disaster. These maps highlight regions experiencing sudden changes in population counts per municipal area, enabling humanitarian organisations to identify both affected communities and locations where displaced people have relocated.



Source: DISHA

2. Poverty nowcasting

The second component is a poverty nowcasting model, which uses machine learning techniques trained on census data, mobile usage patterns and other anonymised signals to generate updated estimates of poverty levels. The model combines multiple indicators to provide a more dynamic picture of socio-economic vulnerability, helping responders prioritise assistance for populations with lower capacity to cope with shocks.



Source: DISHA

How the DISHA solution supports action

The DISHA platform is designed so that it does not need to be activated when a disaster occurs - it is continuously active with mobility insights refreshed daily, standing ready to support decision-making whenever needed. This differs from earlier mobile data initiatives that relied on ad hoc data requests triggered by specific events and often unlocked data too late.

Humanitarian organisations can access a dashboard showing dynamic maps of population movement and vulnerability indicators. These insights can support a range of operational decisions, including:

- Identifying areas receiving displaced populations
- Prioritising locations for aid delivery
- Planning evacuation support and shelter services
- Allocating humanitarian resources more efficiently

Several humanitarian organisations contributed to testing and shaping the platform. For example, Catholic Relief Services has been providing feedback on the design and feature pipeline of the solution since its inception, while other organisations including the Philippines Red Cross and Oxfam helped shape the initial product vision. These inputs have been key to the platform's impact. NGOs that participated in sprint reviews and user-testing sessions informed adaptations to support features such as custom geographic boundaries aligned with aid distribution workflows.

Responsible data use and governance

The DISHA-Globe partnership was designed with strong safeguards for data protection and responsible use. All telco data used in the system is anonymised and aggregated, ensuring that no individual subscribers can be identified. Data is processed within a privacy-preserving virtual private cloud environment where analytical outputs are generated and shared with authorised humanitarian organisations.

The initiative also follows established international guidance on responsible data use. In particular, DISHA adheres to:

- The UN Principles for the Ethical Use of Artificial Intelligence[77]
- The Inter-Agency Standing Committee (IASC) Operational Guidance on Data Responsibility in Humanitarian Action[78]

These frameworks provide safeguards for transparency, accountability and the ethical use of data in humanitarian contexts.

Establishing the partnership also required addressing institutional and legal complexities. A notable challenge involved defining an appropriate framework for data collaboration between Globe as a private mobile operator and the United Nations, given its unique legal status. An initial workaround involved routing the agreement through a third-party entity before transitioning to a direct partnership model between Globe and the UN.

This shared platform structure reduces the technical and legal burden on individual MNOs and allows insights derived from Globe's data to be accessed by all humanitarian organisations operating in the Philippines.

Impact and future potential

The solution was piloted in the Philippines in 2024 and later rolled out to UN agencies working in the country during 2025. It has supported humanitarian response to six major emergencies in 2025, including earthquake Cebu and typhoon Fung Wong, which affected more than 5.6 million people.

By creating an always-on analytical platform, the initiative has made an important shift away from reactive data requests during disasters to continuous operation. This reduces the time between disaster onset and the generation of clear insights for humanitarian responders.

Globe's participation as the first MNO in the DISHA coalition also showcases the viability of responsible mobile data collaboration with humanitarian actors, potentially encouraging other MNOs to explore similar partnerships.

The initiative shows how shared infrastructure and multi-sector collaboration can enable mobile data partnerships, offering a model that could be replicated with other MNOs and humanitarian organisations in disaster-prone regions. The DISHA platform has been designed for scalability and is open to new partners joining the coalition or re-using the know-how and learnings produced in the Philippines, with ambitions to expand into other at-risk countries across South and Southeast Asia.

77 United Nations Inter-Agency Working Group on Artificial Intelligence. (2022). Principles for the Ethical Use of Artificial Intelligence in the United Nations System.
78 Inter-Agency Standing Committee. (2023). IASC Operational Guidance on Data Responsibility in Humanitarian Action.

6. WHAT DRIVES LASTING MOBILE DATA PARTNERSHIPS?

The case studies and wider evidence show that, when designed well, multiple models can support collaboration. What differentiates their outcomes is how they navigate a common set of challenges. The research revealed a consistent set of factors that help explain why some partnerships endure.

6.1 Pre-positioned systems: governance, infrastructure and agreements before crises

Mobile data can only be used at crisis speed when systems are built in advance. While data can be analysed within hours, partnerships can take 12 to 18 months to formalise. As a result, attempts to initiate collaboration during an active crisis rarely succeed.

Where mobile data has informed real-time response, the enabling conditions were already in place. In Haiti, Flowminder has generated mobility insights within days of key events since 2010 – including after the 2021 earthquake – thanks to long-standing data-sharing agreements, technical pipelines and institutional relationships.[79] In the Philippines, DISHA's system was established well in advance of flooding and volcanic eruptions in the country. Similar patterns were observed during the COVID-19 pandemic, where pre-existing analytical products and governance frameworks enabled rapid mobilisation.

This underlines the importance of shifting from ad hoc engagements to pre-positioned systems. These include standing agreements, defined standard operating procedures and technical infrastructure that can be activated when a crisis occurs. Without these in place, each deployment becomes a new pilot, requiring renegotiation of the governance arrangements under time pressure. Elsewhere, the CrisisReady approach – a research-response collaborative based at Harvard University – reflects this shift by focusing on upstream readiness.[80] It establishes data-sharing agreements, governance processes and technical pipelines in advance to enable rapid activation when crises emerge. In doing so, it addresses the recurring bottleneck of negotiation timelines that prevent timely use of private-sector data in emergencies.

From an MNO perspective, such arrangements help to reduce uncertainty. Pre-agreed governance structures clarify how data will be used, which safeguards apply and what partners are responsible for, lowering legal and reputational risk and enabling faster responses when data is requested during crises.

6.2 Designing for MNO viability: minimising exposure and aligning incentives

MNO participation in mobile data partnerships is determined by how data use fits within risk models. As shown in chapter 4, MNO participation is influenced by exposure: legal, reputational and operational. Models that consider and address these risks are consistently more viable.

The case studies demonstrate that the most durable approaches share a common feature: data remains under MNO control. Provider-side analysis, query-based systems and controlled access environments allow insights to be generated without transferring raw data externally. This limits liability for the MNO, protects commercially sensitive information and helps with internal compliance requirements.

These models also redefine the ask. Rather than sharing raw data, MNOs deliver structured outputs. This shift from open-ended access to controlled analytics makes engagement more predictable and easier to authorise internally.

The case for ongoing collaboration is stronger when initiatives align with existing priorities. Where partnerships reinforce government relationships or build internal analytical capability, an MNO is more likely to engage over a longer period. By contrast, bespoke requests with limited strategic value are difficult to justify and rarely scale.

79 Flowminder. (2021). Population movements estimated with mobile operator data from Digicel Haiti: report from 20 August.
80 See CrisisReady.

6.3 Institutional anchoring and authorisation pathways

Legitimacy matters as much as legality for data collaborations to work. Even where data use is legally permissible in a country, MNOs need clear institutional authorisation. Projects anchored within recognised public institutions – particularly national statistics offices, regulatory agencies or credible international institutions – can reduce perceived risks and strengthen internal buy-in, making participation easier to justify and sustain.

The case studies illustrate this dynamic. For example, embedding mobile data analysis within the Ghana Statistical Service created a formal mandate for data use, reducing ambiguity and strengthening the case for ongoing collaboration. Similarly, in Jamaica, the national statistics institute acted as the entry point for accessing mobile data following Hurricane Melissa in 2025.

Global bodies also play a role in shaping the authorising environment. The UN, ITU and World Bank initiatives supporting the use of mobile phone data highlighted in this report provide credibility, established frameworks and convening power that reduce perceived risk for MNOs – as seen in the Philippines.

6.4 Reusable systems and multi-purpose data pipelines

Ongoing data use depends on moving away from ad hoc requests to standing data pipelines. One-off requests can be operationally burdensome for MNOs. Each requires legal review, technical set-up and internal coordination, creating high transaction costs for what would be a limited or time-bound output.

More durable models focus on reusable systems. Established pipelines and standardised analytics can be activated repeatedly, particularly in markets with high exposure to climate hazards. Rather than negotiating access for each use case, these systems embed governance, privacy safeguards and analytical methods upfront, reducing friction over time.

In some cases, adapting commercial products for public use has also worked. For example, during the COVID-19 pandemic, the Public Health Agency of Sweden used MNO Telia's existing Crowd Insights product rather than commissioning a bespoke extract.[81] Because aggregation methods and legal frameworks were already established, deployment moved more quickly and with lower perceived risk. Query-based and algorithms-to-data systems follow a similar logic, allowing MNOs to retain data custody while returning vetted outputs.

Systems are most durable when they serve multiple use cases and institutions. As shown by the case studies, data pipelines developed for public health planning or official statistics can also support humanitarian needs and vice versa. Embedding mobile data insights within existing workflows makes continued investment easier to justify. This is why sustained models are often anchored in statistics offices or development agencies where infrastructure supports multiple policy domains rather than a single use case.

In contexts where mobile data has been integrated into official statistics, data use has become continuous. Estonia's government has leveraged mobility-based indicators since 2008, while countries such as Indonesia and Saudi Arabia have used mobile data for official statistics on an ongoing basis since 2017. These examples show that when data pipelines reach a sufficient level of trust and quality, they can become part of core national data systems rather than short-term initiatives.

81 Ågren, K., Bjelkmar, P. and Allison, E. (2021). "The use of anonymized and aggregated telecom mobility data by a public health agency during the COVID-19 pandemic: Learnings from both the operator and agency perspective". Data & Policy.

6.5 Financing models that sustain engagement

Mobile data initiatives require ongoing investment in infrastructure, compliance and staff time. Fully pro bono approaches rarely scale, while purely commercial models can be incompatible with humanitarian funding structures. Cost-recovery models attempt to bridge this gap by recognising the costs for MNOs without treating data as a standard commercial product. In practice, however, these can be difficult to sustain. Humanitarian actors often expect data to be treated as a public good while MNOs incur ongoing costs to maintain data pipelines, creating misalignment around compensation and long-term ownership.

Pooled funding mechanisms can offer one pathway. The World Bank and ITU's Global Data Facility is notable because it bundles funding, institutional coordination and capacity building, supporting longer-term system development rather than one-off analysis.

Sustained engagement depends more on creating shared value than direct monetisation. In practice, this is usually indirect and linked to established services or relationships, with strategic alignment carrying more weight than revenue generation. Examples include payment models for tourism statistics in Indonesia, reciprocal data exchanges with national statistics offices and integration with commercial analytics platforms.

6.6 Cross-sector collaboration and capacity building

Blended partnerships are a consistent feature of lasting models. The case studies show how roles can be distributed to create a functioning system. While MNOs provide data and infrastructure, governments, researchers and intermediaries contribute analytical capacity and translate the aggregated indicators into decisions.

Capacity building is equally critical. Without local ability to interpret and apply outputs, data can be underused. Investment in training, embedded expertise and institutional support improves uptake and creates internal champions for continued use.

In some regions, capacity is being developed at a regional level rather than within individual countries. In Latin America, organisations such as UNFPA, the Economic Commission for Latin America and the Caribbean (ECLAC) and WorldPop, have supported shared methods and regional expertise that can be deployed across multiple countries. This enables countries to draw on regional statistical capacity and peer networks rather than relying on repeated external support, helping embed capabilities more sustainably over time.[82]

Conclusions

The evidence shows that no single partnership model determines success. Projects endure when the fundamentals align: clear governance, limited data exposure, trusted institutional roles and a practical value proposition for all partners. When these conditions are in place, mobile data initiatives are better able to move from one-off analysis towards operational infrastructure.

82 WorldPop: "Sustainable regional support to governments".

7. FORCES SHAPING FUTURE MOBILE DATA INITIATIVES

As the scale and frequency of humanitarian crises increase, there is growing demand for more timely and granular data to inform action. At the same time, the mobile and humanitarian sectors are adapting to changes in regulation, data infrastructure and operating models. Together, these shifts will shape how mobile data is accessed and used in humanitarian contexts.

7.1 Structural conditions: regulation, data access and sovereignty

The most influential forces shaping future mobile data initiatives are the changing regulatory and political environments governing telecommunications data. These factors determine the fundamental conditions under which mobile data can be accessed and shared.

The global regulatory environment continues to evolve, with European data protection frameworks exerting a global influence. As outlined in chapter 3, GDPR-inspired legislation has been adopted or adapted in multiple LMICs, even where institutional capacity varies. Newer instruments such as the EU Data Act and AI Act signal increasing attention to data processing and automated decision-making.[83,84] While anonymised mobility analysis often remains permissible, these developments are contributing to more formalised compliance expectations, requiring clearer documentation, auditability and governance processes.

Alongside privacy regulation, questions of data and algorithmic sovereignty are becoming more prominent.[85] Governments are increasingly attentive to where data is processed, who has access and how cross-border transfers are governed. This may encourage more local processing and closer alignment with national institutions, which could help strengthen the legitimacy of mobile data initiatives. At the same time, political sensitivities can influence how partnerships are perceived, particularly in conflict-affected settings or where international actors are involved.

7.2 Operational conditions: evolving data sources and analytical capacity

Beyond regulation, several developments are reshaping the operational feasibility of mobile data analysis.

Call detail records have historically underpinned most humanitarian applications of mobile data. However, other forms of network-generated data are gaining relevance. XDRs and network signalling data capture a broader range of network events and can provide higher temporal resolution. Because these datasets are not directly tied to billing processes, they may be more adaptable to privacy-preserving approaches in some contexts, creating additional pathways for analysis.

Changes in communication behaviour are also influencing how mobile data is interpreted. The rapid growth of over-the-top services such as WhatsApp and Signal in LMICs means that a smaller share of communication activity is captured through voice calls and SMS. This affects the representativeness of traditional CDR-based indicators, reinforcing the need for evolving analytical approaches and the use of complementary data sources.

At the same time, analytical methods are becoming more sophisticated. Mobile data is increasingly used alongside satellite imagery, weather data and administrative records to provide a more complete picture of population dynamics. A broader ecosystem of mobility data is also emerging, with aggregated indicators produced by both public and private actors.[86] These blended approaches can strengthen interpretation and reduce reliance on any single data source.

Advances in AI are shaping this landscape. Machine learning and emerging generative AI (GenAI) applications are enabling more automated data processing and analysis within secure operator environments, lowering the level of technical expertise required to generate insights while maintaining privacy safeguards. Agentic AI could extend this further by enabling users to interrogate complex datasets through guided, task-based workflows, potentially widening access to analysis without requiring direct access to raw data.

As these approaches evolve, the capacity to implement them is also expanding, although unevenly across contexts. Many MNOs are investing in data science teams and analytics capabilities, increasing their ability to generate aggregated indicators internally and integrate multiple data sources. While gaps remain, these developments point to a more integrated and adaptable analytical ecosystem for mobile data use in humanitarian contexts.

83 European Commission. (2025). "Data Act explained".
84 European Parliament. (2025). EU AI Act: first regulation on artificial intelligence.
85 GSMA Mobile World Live. (2026). AI Survey Report 2026.
86 Aydoğdu, B. (2026). Mobile Phone Data for Crisis-Induced Migration and Mobility.

7.3 Ecosystem shifts: commercialisation of MNO data and institutional consolidation

MNOs and network equipment vendors are increasingly developing advanced analytics platforms that integrate network and business data into unified systems. In higher-income markets, these capabilities are often designed to support commercial use cases such as marketing analytics, network optimisation and location-based services.[87] While this reinforces mobile phone data as a strategic commercial asset, it also expands the analytical infrastructure and tools available within MNO environments.

This could introduce new pathways for humanitarian engagement. As analytical capabilities become more standardised and embedded within MNO systems, there may be greater scope to generate insights through existing platforms rather than bespoke data-sharing arrangements. However, these capabilities are primarily developed with commercial objectives in mind, meaning their application for humanitarian contexts will depend on alignment with MNO priorities, governance requirements and funding models.

Alongside these developments in the mobile industry, humanitarian organisations are adopting more data-informed and predictive approaches to crisis response. As these approaches mature, organisations are paying more attention to ethical risks and governance requirements associated with data-driven decision-making.

Several initiatives are working to institutionalise mobile data collaborations. Programmes such as the World Bank and ITU's Global Data Facility are supporting countries to establish governance frameworks, technical pipelines and institutional capacity for mobile data use, while other organisations are developing shared standards and partnership models.

These trends reflect a shift away from isolated pilot projects to more structured and repeatable approaches. While the extent to which these developments lead to fully scalable models remains uncertain, they indicate a convergence of technical capability, institutional frameworks and partnership design.

Conclusions

Overall, these developments point to a more structured operating environment for mobile data initiatives, compared with earlier pilots. As regulatory expectations increase and data ecosystems evolve, the design of partnerships becomes more critical. Models that minimise MNO data exposure, embed governance upfront and anchor collaboration within trusted institutions are likely to become more important. At the same time, growing demand for real-time insights strengthens the case for pre-positioned systems and reusable data pipelines.

Future mobile data collaborations will therefore depend on whether partners can translate these evolving capabilities into responsible, operational models that meet humanitarian needs while remaining viable for MNOs.

87 See: GSMA Intelligence.

8. CONSIDERATIONS

The opportunity to benefit millions of people through mobile data-informed humanitarian action remains significant. Successful pilots, proven technologies and a growing set of public-private partnerships have shown what is possible. Progress now depends on aligning humanitarian needs with MNO realities. The following considerations are posed to close this gap.

Humanitarian actors

Pre-position systems and partnerships	— MoUs, approvals and pipelines can take months to put in place and rarely succeed during an emergency. — Where mobile data has supported real-time crisis response, a system was already in place. — Clarity on governance, safeguards and outputs require time and negotiation, which pay off during crises.
Work through institutions, not just with individual MNOs	— Authorisation and legitimacy matter as much as the legal basis of data sharing. Engaging with regulators and key government bodies is as important as engaging with MNOs given their role in determining access. — Early engagement helps to clarify what is permissible and how data can be used in the country. It also provides a clearer route for approvals and sets more realistic expectations for MNOs. — Where these are in place, engagement tends to progress more predictably, rather than relying on ad hoc relationships.
Design projects that align with MNOs' operational realities	— Mobile data remains commercially sensitive and tightly regulated, and most MNOs will not share raw or extractable datasets. — Models that keep data behind an MNO's firewall are most viable. — Requests for open access or reusable public datasets consistently stall due to legal exposure and reputational risk. — Approaches that help minimise operational burdens and limit data movement are more likely to be adopted and sustained.
Be explicit about how the data will have an impact	— Define the specific decision upfront (e.g. what communities you are trying to support, which will shape decisions on where to deploy resources). — Determine what data is required based on this decision, rather than starting from what data can be accessed. — Ensure there is a clear path from analysis to action and teams can interpret and use the outputs.
Demonstrate and communicate the impact	— Show how insights from the data led to specific outcomes (e.g. improved response decisions, informing policies, lives impacted) and what the engagement has delivered. — Clear examples of practical value can help justify ongoing support from all stakeholders, including MNOs and funders.

MNOs

Proven models for mobile data partnerships are already in place

- This is not an experimental space – workable approaches have been tried and tested.
- Use cases across Africa, Asia and Latin America demonstrate that mobile data can be used in controlled ways without exposing raw data or creating significant disruption to core systems.
- Established models show this can be done within existing technical and legal frameworks.

These models are clearly relevant in markets exposed to recurring crises

- Mobile data partnerships are particularly relevant in locations where customers are affected by worsening climate hazards or displacement.
- Understanding movement patterns and service usage during these events can support both public response and network planning.
- These use cases are therefore closely linked to core customer needs.

Engagement can align with regulatory and government priorities

- Governments are placing increasing emphasis on data use for disaster response, public health and national policy implementation.
- Structured engagement can position MNOs as constructive partners in these agendas.
- In some contexts, this can support more predictable engagement with regulators on data-related topics.

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