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Digital Health for Resilient Immunisation Services: Fragile and Conflict Settings

1. Why

Fragile and conflict settings is a broad term describing situations of crisis induced by a variety of factors. While there is no widely accepted global definition, these settings include those experiencing humanitarian crises, protracted emergencies, prolonged disruption to critical public services or governance (e.g. due to political or economic challenges, conflict or natural disaster), or armed conflict.[1] The World Bank estimates (2023) indicate that about 2 billion people – nearly one out of four people globally – live in countries affected by fragility due to conflicts, climate emergencies, and economic factors, where systemic challenges hinder access to basic health services, including life-saving immunisations.[2] Disruptions in primary healthcare provision significantly limit vulnerable populations' access to routine immunisation services. This limitation heightens the risk of disease outbreaks, exemplified by the recent surge in cholera across 24 countries.[3] These outbreaks have been exacerbated by overstretched health systems, vaccine shortages, and inadequate water and sanitation facilities. Such conditions disproportionately affect conflict zones where, according to Save the Children (2024), the rate of "zero-dose" children—those who have not received any vaccinations—is three times higher (22.7%) than the global average (7.1%).[4] This

CATEGORIES OF FRAGILE AND CONFLICT SETTINGS

Chronic Fragility

Chronic fragility refers to a sustained breakdown of health systems due to factors including prolonged conflict, volatile political situations, macroeconomic instability, persistently low institutional capacity, and significantly higher risks and costs of engagement

Acute emergencies

Acute emergencies refer to situations that may cause unexpected loss of life, damage to public infrastructure, financial crisis, or heightened risk of morbidity and injury. Acute emergencies can be natural or humanmade and are time limited.

Conflict Setting

A context in which violent events have caused protracted destabilization and fragility, resulting in the absence or disruption of a traditional health system.

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1 https://www.who.int/teams/integrated-health-services/quality-health-services/quality-of-care-in-fragile-conflict-affected-and-vulnerable-settings
2 https://www.worldbank.org/en/topic/social-cohesion-and resiliemce
3 https://www.who.int/publications/m/item/multi-country-outbreak-of-cholera--external-situation-report
4 https://www.savethechildren.net/news/number-children-lacking-routine-immunisations-three-times-higher-conflict-zones-rest-world

disparity underscores a critical issue of vaccine equity, highlighting the urgent need for focused interventions to ensure that all children, irrespective of their circumstances, have equal access to life-saving immunisations.

Delivering care in fragile and conflict settings is fraught with numerous challenges. High mobility of populations during natural disasters or armed conflicts makes it difficult to define and locate target populations, while continuous movement and displacement of people complicate population forecasting, which is crucial for effective vaccination service planning and delivery. Uncertainty about the number of children and their locations exacerbates the complexity of vaccine distribution plans. Additionally, in armed conflicts, healthcare and storage facilities are often targeted, disrupting coldchain and leading to uncertainty around the location and availability of vaccination stocks. Overcoming these challenges will necessitate rethinking the current strategies for immunisation delivery in complex settings.

This case study explores the pivotal role of digital health interventions in supporting immunisation efforts within fragile and conflict settings. It provides an overview of the unique challenges these environments present, highlights how digital health interventions can address these issues, and discusses the challenges and enablers of implementing digital health in complex environments. Finally, it provides key lessons for the successful design and implementation of digital health in these settings.

2. What

Digital Health as an Approach to Immunisation Service Resilience

Since the 2010 earthquake in Haiti, where the deployment of social media, text messages, and satellite imagery proved crucial in the immediate response and recovery efforts, the role of digital health in complex settings has significantly evolved. Building on this foundation, the evolution of digital health gained further momentum a decade later with the widespread adoption of telehealth, contact tracing apps and other digital health interventions during the COVID-19 pandemic.

Digital health is becoming increasingly crucial for immunisation efforts in fragile and conflict settings. Leveraging appropriate technology has been shown to support continuity of services and provide near-real-time access to data to support agile planning, leading to increased resilience of the health system in environments that experience service disruptions. Digital health has been used to support mapping and targeting populations to improve the identification and reach of zero-dose children. Data collection and analysis improves tracking vaccination coverage, early warning for detection of potential outbreaks, and managing logistical challenges to maintain stock levels and prevent stock-outs, thus ensuring continuity of immunisation efforts. In addition, digital health has been used to provide client education and vaccination reminders, improving vaccination uptake and reducing loss to follow-up.

Fragile and conflict settings differ significantly based on the duration, context, and nature of the crisis. Each type of crisis uniquely impacts the healthcare system, and the country's digital health maturity which in turn influences the specific digital health interventions required.

3. How

Examples of Digital Health Interventions for Immunisation by Setting

This section provides examples of digital health interventions in various complex settings including settings of chronic fragility, acute emergencies, and conflict situations. It highlights the key immunisation challenges in these contexts and offers examples of how digital health interventions have or can be effectively leveraged to improve immunisation programs.

Chronic Fragility due to prolonged conflict, political and economic instability or climate crises leads to sustained breakdown of health systems and persistent disruption to vaccination programs significantly impacting the number of zero-dose or under-vaccinated children. In 2019, fragile or conflict-affected countries accounted for 44% of zero-dose children globally[5]. Many fragile settings face denominator challenges and coverage discrepancies, high movement of populations or populations located in very remote settings where mobile clinics have to cover long distances to locate them. One of the primary needs in the concerned settings is the ability to conduct surveillance to accelerate outbreak detection and response, an area where mobile technologies have proven highly effective, especially for community-based surveillance. The use of GIS mapping and real-time monitoring campaign tools, such as those deployed in Mozambique can help improve vaccination forecasting by identifying and tracking populations, improving data accuracy and optimising vaccine distribution.

USING DHIS2 TO REACH ZERO-DOSE AND UNDER-IMMUNISED CHILDREN IN MOZAMBIQUE

Context

Mozambique is one of the world's most vulnerable countries to climate change. The country has faced recurrent natural disasters such as cyclones, floods, and droughts, which have exacerbated its fragility and severely impacted its health systems compounded by COVID-19, multiple outbreaks and violent insurgency. These challenges have led to a dramatic increase in the number of "zero-dose" children. By 2023, the number of zero-dose children in Mozambique had surged from 97,000 in 2019 to 750,000, highlighting the urgent need for effective vaccination strategies.

Solution

To combat the decline in vaccination rates exacerbated by the COVID-19 pandemic and other crises, a targeted recovery plan was launched. Central to this initiative

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5   Chard AN, Gacic-Dobo M, Diallo MS, Sodha SV, Wallace AS. Routine Vaccination Coverage — Worldwide, 2019. MMWR Morb Mortal Wkly Rep 2020;69:1706–1710

was the deployment of a custom DHIS2 Tracker program for campaign mapping and microplanning. The DHIS2 Tracker is designed for real-time data collection, tracking, and analysis. It allowed health workers to capture detailed information about each vaccination event, including the location, date, and type of vaccine administered. This data is then used for monitoring campaign performance, updating campaign strategy, micro-planning and resource allocation, ensuring that vaccination efforts are directed where they are needed most.

Outcome

The DHIS2 Tracker was piloted in five priority provinces during a campaign that aimed to vaccinate children under five across 73 districts. The tool enabled precise real-time tracking and micro-planning, helping health workers vaccinate 19,021 children by capturing and utilizing detailed location and vaccination data. Despite the challenges faced in some provinces, this approach facilitated immediate improvements in vaccine coverage and set a precedent for expanding digital health solutions in Mozambique's public health strategy. The success of the DHIS2 Tracker program demonstrated its potential to enhance the capacity to manage future vaccination campaigns effectively and equitably.

A persistent issue in complex settings is health workforce shortages with very limited access to diagnostic tools and often overwhelming patient case loads which impacts the quality of care and the overall trust in the health system. MSF has developed eCare, a suite of digital decision support tools, which can be adapted and deployed in different local settings.

MSF have developed MSFeCARE-Ped, an electronic Decision Support System (eDSS) for pediatric primary care. Medical field workers use a mobile tablet to go through a series of questions during a patient consultation. The result is a clinical decision support to aid diagnosis and treatment recommendations.

MSF have developed a new vaccination module to support front-line health workers with selecting the age-appropriate catch-up vaccinations for all children who have missed vaccinations. The module is adaptable to different vaccination schedules of different countries.

Acute emergencies similar to other vulnerabe settings share several risk factors including overcrowding, poor sanitation, and disrupted immunisation services that significantly increase the likelihood of communicable diseases, leading to higher morbidity and mortality rates, particularly from Vaccine Preventable Diseases[6]. The sudden influx of affected individuals leads to rapid resource depletion and I require immediate, large-scale health interventions, to prevent catastrophic health outcomes that emerge within days or weeks of the crisis onset. In emergency settings getting resources - including physical infrastructure, workforce, and supplies quickly - is critical. Often, digital health interventions are not ready to be adapted and deployed immediately, designing products for global use that need minimal adaptations or quickly configurable pre-empted adaptations. ICRC are currently working to develop an "Emergency Shelf" that includes identifying a suite of digital health interventions that have been proven in one country with potential for cross-context relevance and elevate them into global solutions that can be deployed quickly in novel emergency contexts

The International Committee of the Red Cross (ICRC) have developed Pharmacy stock management tool which is an integrated and standardized medical stock management system that has moved processes from paper to digital managed with improved stock, visibility, planning and optimization. The tool allows to capture supply quantities distributed from the pharmacy, stock losses, and stock corrections by using a mobile device and scanning barcodes.

The tool is designed for complex settings, focusing on an easy-to-use workflow for end users, particularly when stock management isn't a top priority. It pairs with an offline-capable mobile solution, ensuring data collection can continue despite connectivity issues. By simplifying the process to collect just three data points, it minimizes the workload for storekeepers while still enabling health program managers to monitor data and place orders effectively. The tool was used in Nigeria saving up to 40hours a week of pharmacists' time. It is currently being adapted to be used in the Gaza crisis.

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6 https://www.who.int/teams/immunisation-vaccines-and-biologicals/essential-programme-on-immunisation/implementation/vacci-nation-in-humanitarian-emergencies

Conflict settings where active, armed conflicts occur, can lead to the destruction of health infrastructure, targeting of health workers, and severe disruptions to immunisation services. In these areas, some regions may become inaccessible or controlled by different groups, making vaccination efforts exceedingly difficult. Shortages in the healthcare workforce are among the most significant issues in war-affected communities, further exacerbated by the targeting of healthcare workers, facilities, and storage sites. These issues lead to a breakdown in routine immunisations due to difficulties in identifying and reaching the target populations, shortages of health workforce and overstretched health system and limited visibility and loss of vaccine stocks.

In conflict-affected regions of the Middle East and North Africa, digital health interventions have been deployed to dynamically respond to the different challenges presented.

Since 2010 UNRWA have developed electronic health records (e-health system) to improve the monitoring and facilitation of health services provided to Palestinian refugees across Jordan, Syria, Lebanon, West bank and Gaza. Before the war in Syria, there were nearly 500,000 Palestinian refugees living in the country. Following the start of the civil war, many of these refugees fled to neighboring countries. "The use of unified electronic medical records by UNRWA was invaluable during and after the civil war in Syria. It allowed us to track and identify Palestinian refugees who moved to other countries and ensure the continuation of their care," UNRWA Head of Field Information Management.

Effective vaccination campaigns also depend on robust stock monitoring to manage commodities and prevent stockouts. Electronic logistics supply chain systems, particularly those utilizing cloud storage, are invaluable in these situations. They help circumvent data loss when health facilities are targeted or inaccessible, as seen in the current civil war in Sudan, where there are ongoing efforts to implement a mobile digital solution for supply chains to improve stock management.

Conflict, natural disasters, and other crises in vulnerable settings can often lead to large-scale population displacement. Displaced populations, including refugees, internally displaced persons (IDPs), or undocumented migrants, face unique and significant challenges in accessing health services due to their legal status, language and cultural barriers. The precarious living conditions exacerbate the risk of outbreaks, while also significantly disrupting the delivery of routine immunisations. Due to the high mobility of these populations, it is very difficult to forecast vaccination needs. Vaccination record keeping and documentation also present a major challenge for sedentary populations in camps or mobile displaced populations where paper cards are easily lost or forgotten. In such situations, digital health interventions have proven valuable by creating personal records and unique IDs to track displaced populations across cities or even countries, improving forecasting and planning of vaccination needs and ensuring continuity of vaccination efforts.

CASE STUDY: MERA APPLICATION FOR REFUGEE IMMUNISATION TRACKING IN LEBANON (2014-2016)

Challenge

Between 2014 and 2016, Lebanon faced significant challenges with immunisation among Syrian refugees. The Syrian refugees, who often arrived without their vaccination records, created a critical gap in tracking and managing immunisations. For those registered with the UNHCR, an identification number was available; however, for newcomers, there was no Unique ID. This situation was exacerbated by measles outbreaks originating in informal settlements, highlighting the urgent need for an efficient system to document and track vaccination data.

Solution

In response to these challenges, the Lebanese Ministry of Public Health, supported by international partners, implemented Mobile EPI Registration Application (MERA) which is an offline mobile application that is used by immunisation points beyond the PHC centers and in the field and connects to Primary Healthcare Information System (PHENICS).

Outcome and key success factors

MERA was used to create a Unique ID for Syrian refugees, facilitating the recording and tracking of immunisation data across the country. Its strength lies in its long-term use, making it familiar to health workers. The system is user-friendly, available in Arabic features prompts and drop-down menus instead of free text, enhancing usability. It is also developed and owned by the Ministry of Health, allowing for adaptability across various immunisation efforts, activating and deactivating modules as necessary.

Digital health interventions can significantly strengthen the resilience of health systems in fragile and conflict settings. It's important to note that multiple crises often occur simultaneously in these environments, which means that challenges are also compounded. In many countries, there are active wars, climate crises, economic crises and multiple outbreaks occurring simultaneously. While challenges may vary, the versatile nature of many digital health interventions allows them to be used effectively across different settings, provided they are adapted to local conditions.

The table below illustrates various digital health interventions used in fragile, humanitarian and conflict settings, grouped by priorities from Gavi's DHI Strategy.

Gavi DHI Priorities	Digital Health Intervention	Use Case
Identification and reach of zero-dose and under-immunised children	Mobile Reporting Tools	Facilitates real-time monitoring of immunisation coverage to identify zero-dose children
	Patient Record Management Systems	Creates personal records and unique IDs to improve tracking of displaced populations' vaccination history.
Digital interventions supporting vaccine confidence and demand for immunisation	Vaccination Reminder Applications	Sends reminders to caregivers, improving vaccination uptake and reducing loss to follow-up.
	Community Engagement Platforms	Enables community feedback to shape digital health tools, enhancing local ownership and trust.
Real-time planning and monitoring of immunisation campaigns	GIS Mapping and Monitoring Tools	Assists in population mapping and tracking for efficient vaccine distribution in complex settings.
Digital supply chain information systems (eLMIS)	Stock Management Tools	Manages vaccine stocks and prevents shortages
Cross-cutting	Data Collection and Analysis Tools	Improves tracking of vaccination rates and supports decision-making with real-time data.
	Digital Training Programs	Enhances digital literacy among healthcare workers to ensure effective use of digital tools.
	Telehealth Services	Provides remote consultations to support healthcare access in areas with limited resources.

4. Results

Implementation Challenges for Digital Health Interventions for Immunisation in Complex Settings

Implementing digital health interventions for immunisation in fragile and conflict settings presents a myriad of challenges that necessitate careful consideration and strategic planning. These challenges encompass various aspects of health system functionality, governance, and the socio-political landscape.

Health system challenges:

- **Infrastructure challenges** such as weak internet connectivity and patchy electricity are more pronounced in fragile and conflict settings. With ongoing conflict, targeting of infrastructure is common and maintaining and securing infrastructure is challenging due to ongoing security threats. Moreover, humanitarian crises typically occur in regions with limited financial and technical resources to build and maintain robust infrastructure. This scarcity exacerbates issues like power outages and limited internet coverage. It is thus important to consider more resilient infrastructure such as satellite internet stations as well as tools with battery power and offline digital capabilities.

- **Migration and/or targeting of healthcare workers** is one of the key challenges in fragile and conflict settings diminishing the pool of skilled professionals. Digital health interventions selected should be cognizant that available health workers are overstretched. Therefore, it is important to reuse their existing tools, integrate the tool with existing or simple workflows, and ensure the interventions are user-friendly and intuitive.

- **Data governance and data security** concerns also pose a major threat, as the sensitive nature of health information requires robust protection mechanisms that are often lacking in these environments. In some contexts, data breaches could lead to targeting persecuted groups. In accordance with data protection standards, digital tools should minimise personally identifiable information. Stringent data security protocols for humanitarian organisations, while for good reasons, also create challenges as cross-border movements of data or contributing of training of algorithms.

- **Resource constraints:** financial constraints in long-term (often forgotten) crises or material constraints in emergency settings limit the ability to invest in, deploy and sustain digital health technologies. It is critical in these settings to coordinate and leverage the resources available in the health system to support digital health interventions. In some emergency settings, field teams have to co-locate the servers in the morgue where both can leverage the same cooling system.

Other challenges vary greatly depending on the nature and location of the crisis such as:

- **Low levels of digital literacy and waning motivation** among health professionals and central agencies can significantly hinder the effective adoption and utilisation of technology. Effective and considered change management is crucial in communicating the value of the tool to stakeholders. Finding local champions who could advocate for digital health interventions and provide mentorship and training can help overcome these barriers. These champions can demonstrate the benefits of digital technologies, motivate their peers, and ensure the sustainability of digital health interventions. In addition, presenting data on the value of the tool, adapted to the audience and their values, is important in demonstrating its success and gaining more buy-in.

- **Overwhelmed national institutions** in situations of crisis often lead to poor oversight and fragmented implementation of digital health interventions, complicating coordination and integration efforts.

- **The political landscape** of crisis-affected regions is critical in shaping the response. In some countries there are multiple parties governing the health system, preventing national scaling of digital health interventions. Authoritarian regimes, armed conflicts or civil wars can abruptly halt digital interventions, specifically any use of mapping or Geographic Information Systems.

- **Lack of trust and acceptance** among affected populations can undermine effective deployment of digital technologies, oftentimes sparking suspicions and putting health workers' lives in danger. Working within the humanitarian cluster with the community and its leaders and using simple scripts to inform local populations about the tool is helpful in mitigating suspicion.

- **Changing nature of crises:** Historically, crisis situations follow clear phases, transitioning from emergency response to recovery and development. However, the landscape has changed dramatically, with protracted and chronic issues frequently overlapping with acute crises. This overlapping nature creates a more complex and challenging environment which complicates funding allocation and necessitates more adaptive and sustained strategies to effectively address the intertwined challenges.

- **Short-term nature of humanitarian funding** leads to reluctance to invest in digital health interventions - both in the development, deployment and maintenance of tools, as well as investment in broader digital health infrastructure necessary for an enabling environment.

- **Siloed response to crisis** often leads to duplication of digital health interventions, resulting in wasted resources and fragmented care. Multiple initiatives may overlap without coordination, causing inefficiencies and increasing the burden of the healthcare workforce.

Digital Health Enablers for Immunisation in Complex Settings

Enablers of implementing digital health interventions for immunisation in fragile and conflict settings are crucial for overcoming challenges and ensuring successful implementation.

- **The increasing penetration of mobile technology,** even in remote areas, serves as a foundational asset, facilitating improved reminder and recall systems, campaign planning, outreach efforts, and enhanced monitoring and surveillance.

- **Growing levels of digital literacy** among some affected populations can enable effective digital health programs. For example, a mobile health program that sent vaccination reminders to Syrian refugees in Jordan has proven valuable in improving vaccination coverage and decreasing the risk of lost follow-up for parents who downloaded the app.

- **Designing digital solutions based on the local context:** In places with unstable internet, digital tools that can function offline and store data locally until an internet connection is available are critical. In addition, digital health programs can increasingly circumvent infrastructure limitations by taking advantage of satellite internet, especially as satellite dishes are getting smaller.

- **Presence of in-country champions** who advocate for and support the adoption of digital health interventions is vital for driving local engagement and ensuring sustainability. These champions act as the linchpins in the implementation process, fostering a sense of ownership and commitment to the success of these initiatives.

- **Inherent resilience of affected communities,** along with their adaptability and willingness to embrace new solutions, plays a pivotal role in the successful deployment of digital health interventions." It is impressive the ability of communities in fragile and conflict settings to develop adaptive strategies to cope with ongoing challenges, this resilience and adaptability can't be understated, it is critical to the response and recovery." Structured on-ground network to train people, can significantly facilitate the process of implementing digital health interventions by building on local capacities available.

> **"**
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> *In some countries, we have seen super-users mentoring and supervising others, and even creating centres of excellence and supporting neighbouring countries.*
>
> **"**
>
> *Program Manager, ICRC*

5. So what

Digital Health Maturity

The overall digital health maturity of countries classified as fragile and conflict settings can vary significantly. The Global Digital Health Monitor (GDHM) measures digital health maturity across seven key categories: leadership and governance, strategy and investment, legislation, policy and compliance, workforce, standards and interoperability, infrastructure, and services and applications. The maturity scale ranges from Phase 1 to Phase 5, where Phase 1 represents the least developed stage, characterised by minimal digital health capacity, and Phase 5 indicates the most advanced, with integrated and scalable digital health systems. GAVI classifies 12 countries as fragile and conflict settings, of which 6 have available data in the GDHM from 2023 (see Annex 1). Among these, most countries are in Phases 2 or 3 across the assessed categories, with Mali standing out for its higher maturity in Strategy & Investment (Phase 5) and Niger advancing to Phase 4 in Legislation, Policy & Compliance. However, Workforce and Infrastructure remain the most commonly underdeveloped domains, reflecting significant challenges in capacity building and foundational infrastructure—critical areas for achieving sustainable digital health progress.

These data underscore the urgent need for increased focus on workforce and infrastructure challenges and tailored, country-specific interventions that take into account each nation's current maturity level. It is essential to prioritise digital health interventions that align with a country's present capabilities, ensuring effective implementation and maximising potential impact.
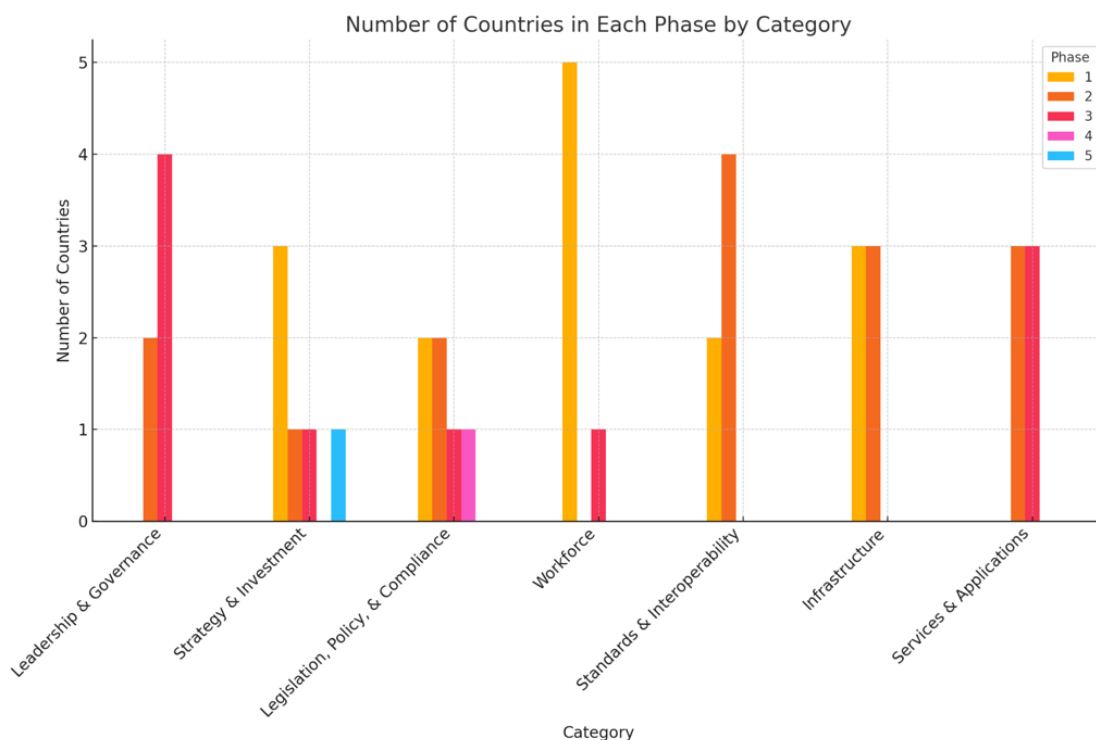

Figure 1. Digital health maturity of fragile and conflict countries (based on Gavi's classification) by category

Key Considerations for the Design and Implementation of Digital Health Interventions in Fragile and Conflict Settings

The section below provides an overview of key considerations for designing and implementing digital health interventions in complex settings. While far from exhaustive, it is intended to highlight the key themes for successful interventions.

Design considerations

Offline-first digital solutions

In complex settings, internet access can be unpredictable. Digital health interventions should prioritise offline functionality, with frequent automatic data saving. This ensures continuity of care and data integrity regardless of network availability.

Simple workflows

Minimising the complexity of workflows and prioritising a small number of critical data points ensures ease of use, reduces the likelihood of errors and facilitates faster training of healthcare workers, crucial in high-stress, low-resource settings.

Resilient infrastructure

Using resilient infrastructure such as satellite internet can provide a reliable connectivity solution in areas where terrestrial networks are unreliable or non-existent.

Pre-build solutions for rapid, remote deployment

Interventions should be built to require minimal adaptations to be effective across various scenarios. Preemptively identifying potential adaptations to be integrated as needed ensures the system remains functional in diverse and rapidly changing environments. In addition, should be deployable remotely, minimising the need for on-site technical support which is important in conflict zones where access can be restricted or dangerous.

User-friendly features

Leveraging tools and systems that health workers are already familiar with, and incorporating intuitive features such as in-app guides and tool-tips or drop-down menus simplifies navigation and data entry. This approach reduces cognitive load on users, enables a quicker adoption, and enhances the accuracy and speed of their work, crucial in urgent care situations.

Implementation Considerations

Data governance and security

In fragile and conflict settings, safeguarding health data is paramount. Implementing robust data governance frameworks and high integrity architecture ensures that health information is collected, stored, and used securely. This protects patient privacy and maintains trust between healthcare providers and the communities. Effective data security measures, including encryption and access controls, are essential to prevent unauthorised access and data breaches.

Assessment of the Political Landscape and Government Capacity

The capacity and role of government varies based on the specific context and nature of the crisis. Governments are often overwhelmed, yet in many cases, they play a crucial role in stakeholder coordination and community engagement fostering trust and increasing participation among affected populations.

Mainstream routine immunisation efforts within the larger health and humanitarian response

Incorporating routine immunisation programs into the overall humanitarian response is crucial for sustaining public health. This integration helps ensure that immunisation remains a priority even amidst crisis conditions, protecting vulnerable populations from likely outbreaks.

Coordination among humanitarian actors

Effective digital health interventions require seamless coordination among various humanitarian actors. This coordination helps avoid redundant efforts and ensures resources are used efficiently. Collaborative planning and regular communication between actors can align objectives and streamline implementation.

Address gender barriers throughout the design and implementation of digital health interventions

In many contexts, women and girls encounter specific challenges, such as cultural norms that restrict mobility, limited decision-making power, and a lack of access to healthcare facilities. Identifying and addressing these obstacles through community engagement and consultations is essential for developing tailored digital health interventions. Customising digital health tools with gender considerations, like simplified interfaces and caregiver-focused features, ensures they are accessible to women. Additionally, empowering women as community leaders and healthcare workers can enhance trust, improving the uptake of immunisation services and fostering broader community support. Effective monitoring and evaluation of digital initiatives, incorporating gender-specific metrics, will ensure these interventions are equitable and impactful.

Annex 1

GDHM 2023 Data on Digital Health Maturity for GAVI countries classified Fragile and Conflict Settings

Country	Leadership & Governance	Strategy & Investment	Legislation, Policy, & Compliance	Workforce	Standards & Interoperability	Infrastructure	Services & Applications	Overall
Afghanistan	Phase 3	Phase 1	Phase 1	Phase 1	Phase 2	Phase 1	Phase 2	Phase 2
Central African Republic	Phase 2	Phase 2	Phase 1	Phase 1	Phase 2	Phase 1	Phase 2	Phase 2
Mali	Phase 3	Phase 5	Phase 3	Phase 3	Phase 2	Phase 2	Phase 3	Phase 3
Niger	Phase 2	Phase 3	Phase 4	Phase 1	Phase 2	Phase 1	Phase 3	Phase 3
Chad	Phase 3	Phase 1	Phase 2	Phase 1	Phase 1	Phase 2	Phase 2	Phase 2
Papua New Guinea	Phase 3	Phase 1	Phase 2	Phase 1	Phase 1	Phase 2	Phase 3	Phase 2

*Somalia, South Sudan, Sudan, Haiti,Syrian Arab Republic and Yemen data are unavailable