Digital Technology in Forced Displacement Settings: Middle East and North Africa (MENA) Case Studies

SUMMARY

A wide range of new technologies are progressively being used for data collection, project planning, implementation, and monitoring and evaluation in forced displacement contexts. This note highlights case studies from countries in the Middle East and North Africa Region and provides practitioners with specific examples of technology use.

Why is digital technology useful in forced displacement environments?

According to the UNHCR, 70.8 million people have been forcibly displaced worldwide, often due to conflict and violence. While it is estimated that 90% of the disease burden among forcibly displaced populations comes from communicable diseases, non-communicable disease and mental illness are also prevalent among this population.

However, access to healthcare in host countries is often limited due to lack of entitlement to basic services based on a migrant's legal status in the host country. As a result, both development and humanitarian partners are focusing on improving access to health services through innovative service delivery mechanisms. To address the needs, the World Bank Group has allocated US$2 billion for the IDA18 regional sub-window for refugees and host communities. In addition, the Health, Nutrition and Population Global Practice of the World Bank Group currently implements 34 projects totaling over US$2.8 billion in fragility, conflict and violence (FCV)-affected settings.

The Middle East and North Africa (MENA) region has a variety of countries affected by FCV. Some are in active conflict like Libya and Yemen, while others are experiencing protracted crises like Syria. Consequently, non-conflict countries in the region, like Djibouti and

Lebanon have been prone to more fragility because of an influx of refugee populations from neighboring countries and the strain experienced by basic service delivery systems, including health.

FCV settings in general often pose challenges to both local health systems and service providers that deliver needed health services. As in the case of many MENA FCV affected countries, conflicts lead to forced displacement, inaccessible areas, infrastructure damage, and unique health challenges. For example, in Yemen, war-related damage to health facilities, water and sanitation infrastructure have led to 18 million people lacking access to basic healthcare and over one million cases of cholera in the past year.

For World Bank teams, FCV environments add more constraints to planning, implementing, monitoring and evaluating projects. Specifically, given the unique challenges of forced displacement, the teams are required to understand the following:

(1) What health services are most necessary and where they are needed;
(2) How key health services can be delivered to those in need; and
(3) How teams can monitor and evaluate the services being delivered to target populations (i.e. forcibly displaced populations).

Digital technology has proven to be useful and effective in addressing the numerous challenges in FCV settings. It allows teams to plan, implement and monitor tasks in remote and/or insecure environments.

As a complement to the previous publication by the World Bank Group on the use of technology in FCV situations (*Using Technology in Fragile, Conflict, and Violence Situations: Five Key Questions to be Answered*), this note highlights operational examples and lessons-learned from four countries: Djibouti, Lebanon, Libya and Yemen. The purpose of this note is to showcase their successful experiences in integrating digital technology into health operations. The note also explores the risks and mitigation measures that are essential in using digital technology in FCV settings.

What FCV specific challenges can be addressed by using digital technologies?

1 Assessing Population Movement and Settlements: *Djibouti*

Djibouti, one of the smallest countries in the MENA region, has an estimated 100,000 migrants in transit every year and hosts about 30,000 refugees from many of its neighboring countries, including Yemen and Somalia. Additionally, the country is home to a traditional nomadic population. Since there had previously been no disaggregated population data, one of the challenges faced by Djibouti's Ministry of Health, and health service providers, was determining where health services were needed as populations traveled.

The World Bank's *Towards Zero Stunting* nutrition-focused project in Djibouti addressed this challenge through the use of geospatial mapping, satellite imagery, and machine learning. The technology allowed the project's team to determine the location of 24 primary, secondary and tertiary health facilities as well as 33 rural community health posts throughout the country. Not only did it provide a location for all health facilities, but it allowed the team to determine catchment areas for each health facility. Determining the catchment area is important as it allows health workers to create zones which help them to better understand the populations in their areas and the services that the population receives. The catchment areas are also useful to mobile clinic drivers in helping to direct them to underserved populations.

The team was also able to monitor the number of rooftops in a particular service delivery zone based on the catchment areas. Using technology, relevant imagery was broken into pieces and the probability of a building being present was calculated and assigned as a score. Using this method, both permanent structures and settlements were detected. With this innovation, nomadic and migrant populations that were difficult to track could now be matched to nearby health facilities. Further, the innovation helped the World Bank team to target certain areas which held populations without nearby health and nutrition services.

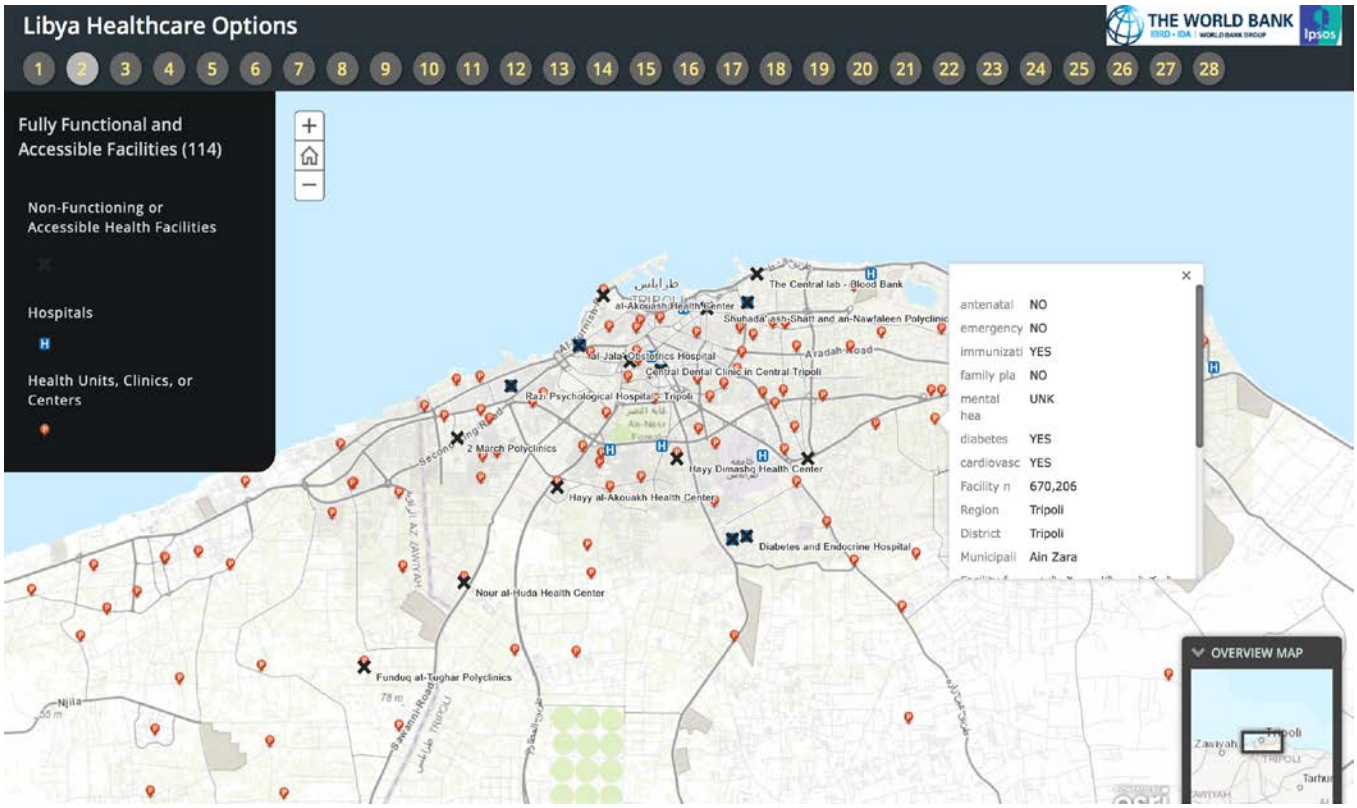
Satellite imagery and machine learning used to detect rooftops, designated by the green outlines, in Djibouti. Left: An urban area in Djibouti. Right: A rural area in Djibouti.

2 Delivery of Services and Infrastructure Assessment: *Libya*

Once mobile populations have been identified, it is important to determine the services to which they have access. Libya, a country in active conflict, not only has internal displacement, but an estimated 700,000 or more migrants coming from neighboring countries. In this setting, it was difficult for the World Bank team to determine which facilities were available to provide specific services since many facilities had broken equipment, were damaged, or were in inaccessible areas controlled by various militias.

To determine the services available in two of Libya's major cities, Tripoli and Benghazi, the World Bank team triangulated data from, satellite imagery and social media analysis, in conjunction with using more traditional data from the World Health Organization (WHO) Service Availability and Readiness Assessment (SARA) and health facility surveys. While the SARA was used as a basis to locate facilities, satellite imagery was used to identify the accessibility of facilities, by taking overhead pictures of roads, entries to facilities, etc. Additionally, social media sites, like Facebook, were then used to analyze facility activity and to investigate complaints, helping the team to determine services available at different facilities. Facility surveys of both patients and providers were done in public health facilities by teams with tablets that could upload data to a server for immediate availability.

With these technologies, the team was able to map the location of every public health facility in these cities, as well as the services provided in these facilities. This helped the team to determine which populations had access to particular services, such as antenatal care, immunizations, or other specialized care. Determining the location and caliber of services in each area will allow the team to assist the Ministry of Health in determining where to allocate funds for populations in need and where to scale up services for those populations.



Map of Tripoli, Libya showing all health care facilities. At each facility, the team was able to determine the type of services available.

3 Monitoring and Evaluation: *Yemen and Lebanon*

The fluidity and political instability that exists in Yemen, an active conflict country, renders traditional monitoring and evaluation mechanisms nearly impossible to implement when providing oversight to existing health services. Yemen is also different from other contexts in that the World Bank does not have any staff in the country and must partner with UN agencies like WHO and the United Nations Children's Fund (UNICEF) to implement interventions on the ground. The challenges in this setting have afforded the World Bank and its partners the opportunity to use unique digital technologies for the oversight and monitoring of interventions.

In Yemen, fuel is provided to hospitals as an energy source. It is important to ensure that the fuel is in fact being used for hospitals and not redirected to militias or other causes. This need for monitoring led to the use of fuel sensors. The fuel sensors, located in the fuel tanks, have the ability to upload real-time data to a web-based server, indicating the exact amount of fuel in the tank. This lets the monitor ensure that the fuel levels coming from the tank are appropriate for a health facility and do not indicate evidence of stealing, redirecting fuel, or other related corruption. Another similar technology is being developed for fuel trucks in Yemen. These trucks will also include a GPS tracking system that will upload the coordinates of the fuel trucks at all times.

Lebanon has a different context in which the health system is not under strain because of its own conflict, but because of the conflict of neighboring Syria. Due to the influx of refugees from Syria, it estimated that Lebanon's population grew 30 percent in just six years. The strain that this has placed on the health system not only makes the scale up of services necessary, but makes it essential to have a proper grievance mechanism in place to monitor the effectiveness of the services being provided. To address this concern, the World Bank team supported the creation of an automated module in which one platform was created to track and manage grievances. The platform pulls from registration databases and other sources. The grievances are then uploaded to the Ministry of Public Health web-based server for timely response. The method of pulling grievance data from multiple sources is considered to be a global standard.

Fuel sensors are used in Yemen to monitor levels in oil tanks used to service health facilities.

What are the challenges and risks to consider when using digital technologies?

The primary challenge to using digital technology is that the World Bank teams are tasked with trusting information, often in situations that they cannot access. For this reason, it is always important to triangulate data from multiple sources to verify information and to ensure the validity of the data being collected. In the Libya example, the team found that there were facilities that technically showed the availability of certain services after using one source, but many of these facilities proved to be inaccessible based on satellite imagery data. This emphasizes the need to triangulate multiple data sources, particularly in FCV and forced displacement settings. Similarly, in the Djibouti example, to avoid the risk of bias from one data source, more than one technology was used to triangulate the location of mobile populations. While one technological method can be used as a base, it is important to triangulate with multiple sources for the best data verification.

Additionally, project implementors should note that technological solutions cannot work in silos, but must work within the framework of a larger system in order to be effective. For example, in Yemen, the fuel sensors worked well because of the presence of a web-based server that allows remote monitoring of the system. In some countries, the social media analysis in Libya would be ineffective due to the lack of internet access. Further, it is important to note the legal framework of each country to determine what technologies and use of information is permitted prior to engaging in technological solutions.

BOX 1.1 Risk Considerations when Selecting Technologies in FCV projects

- ✓ **Bias.** Technologies can make data collection faster and easier, but they can also introduce bias. If cellphone ownership is concentrated in certain areas or among certain demographics, SMS-based surveys will disproportionately capture those groups and may not be appropriately representative of populations in need.
- ✓ **Verification**. Data collected using remote technologies often needs to be verified through other modalities to ensure accuracy and reliability. This process often involves some degree of "triangulation" with other sources.
- ✓ **Safety.** While remote technologies can make data collection safer, some technologies may expose in-country teams to elevated risks. Because tablets can be resold for a profit, for example, using them may make survey teams targets for theft or attack. Armed groups have also been documented as harassing enumerators using tablet-based technology.
- ✓ **Privacy.** For technologies relying upon GPS data (cellphones, sensors, etc.) to track locations or population movement, care should be taken to ensure that all data is de-identified and no personal information is collected without consent. Authorities in many Arab spring countries have used social media posts to identify and target outspoken critics.
- ✓ **Perception.** Depending upon the context, the use of certain technologies, such as satellite imagery or GPS tracking, can be perceived as "spying" by populations or authorities, and care should be taken to explain these modalities in advance to local partners and ensure local acceptance.
- ✓ **Sustainability.** Studies of mobile health pilot interventions have shown that many are often either discontinued or lack feasible plans for scale-up. Particularly for service delivery projects that may incorporate technological solutions, TTLs should consider barriers to scale-up and sustainability.
- ✓ **Cost.** Cost of technology deployment can vary widely. The cost of satellite imagery, for example, depends upon the size of land area or resolution to be analyzed. Many mobile platforms are free, but programmers and surveyors are not.

**Source: Using Technology in Fragile, Conflict, and Violence (FCV) Situations: Five key questions to be answered.*

TABLE 1 Risks, Challenges, and Mitigating Measures for Using Technology

Risk	Country	Technology Used	Challenge	Mitigation Measures
Bias	Libya	▪ Social media analysis ▪ Satellite imagery ▪ Facility surveys with tablet	▪ Using one data source alone introduced bias. For example, using social media analysis by itself has the possibility of introducing bias since only a portion of the population has access to internet and social media sites.	▪ Used multiple technologies to triangulate data. ▪ For example, in addition to social media analysis, satellite imagery was used to show if there was road access or damage to facilities.
Verification	Djibouti	▪ Satellite imagery ▪ Machine learning	▪ Using one data source alone proved to be inaccurate.	▪ Triangulation was used so that data was coming in from different sources to verify accuracy. ▪ The satellite imagery showed buildings, but did not show where settlements of migrants were created. ▪ The machine learning combined with satellite imagery showed where migrant settlements were located.
Safety	Libya	▪ Tablets uploading to web-based server.	▪ Areas where ground teams were collecting survey data with tablets was not always safe due to conflict. ▪ Surveyors were at risk for not always being trusted by staff and patients at the facilities.	▪ The ground survey teams were given letters of approval by the government to show credibility in the field. ▪ Teams pulled back from areas where conflict arose.
Privacy	Libya	▪ Social media analysis ▪ Satellite imagery	▪ Adhering to consumer privacy standards.	▪ The World Bank team ensured that all data used was publicly available. For example, social media posts and satellite images are available for public consumption.
Perception	Djibouti, Libya, Yemen, Lebanon	▪ Social media analysis ▪ Satellite imagery ▪ Facility surveys with tablet ▪ Fuel sensors ▪ Automated grievance system	▪ Governments and beneficiaries may perceive technological innovations as privacy invasion.	▪ In all cases, the World Bank used transparency with the governments to ensure that all data and processes were made available, so that there were no perceptions of spying or obtaining unauthorized data access.
Sustainability	Djibouti	▪ Satellite imagery ▪ Machine learning	▪ Target populations move, so the data on beneficiary locations and catchment areas must be constantly updated.	▪ This requires a GIS information officer to manage the incoming data and generate new maps as populations move.
Cost	Djibouti, Libya	▪ Rooftop mapping ▪ Geospatial mapping and social media analysis	▪ Technology costs can vary.	▪ Djibouti's rooftop mapping costed USD$15,000 for the entire country. The cost here can vary based on the size area that needs to be mapped. ▪ Libya's geospatial mapping and social media analysis costed USD$50,000 to map the two major cities, Tripoli and Benghazi. This cost will vary based on the size of the area to be mapped.

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