

Mapping Libyan Health Facilities - A collaboration between crisis mappers and the World Health Organization

Jennifer L Chan, MD, MPH
Harvard Humanitarian Initiative
Northwestern University
jennifer-chan@northwestern.edu

Robert Colombo
World Health Organization Mediterranean Centre
colombor@who.int

Altaf Musani
Director, World Health Organization Mediterranean Centre
musania@who.int

ABSTRACT

This practitioner report describes a recent example of the growing opportunities between humanitarian health organizations and the crisis mapping community. The World Health Organization (WHO) partnered with volunteer crisis mappers to quickly collect information and map over 600 health facilities after the 2011 Libya Crisis. This new collaboration between WHO staff, volunteers, technologists, GIS specialists, health cluster partners and a researcher helped provide health and geographic information to support the planning phases of an in-depth countrywide health facility assessment. Outcomes of this collaboration will also aid recovery and reconstructions efforts for the Libyan health system.

INTRODUCTION

Data and information is vital at each stage of the emergency cycle in order to make informed decisions and develop targeted response programs. Seemingly a simple task - the humanitarian environment poses great challenges to timely and effective information collection and management. Fragmented workflows and the process of translating information into timely decision-making is an ongoing and well-documented challenge. (King, 2005; Harvard Humanitarian Initiative, 2011) The health sector, like many others, struggles to make decision amongst a simultaneous deluge and paucity of health information. (Turoff, 2008) One goal of the sector is to support health systems that deliver critical and life saving services in the event of an emergency. Studies have reported over 80% of health information are geographical in nature. (William, 1987) Timely health interventions depend upon where health facilities are located and the status of each identified facility (e.g., hospitals, primary health care centers, health posts). Information of use to first aid responders to guide programs and interventions is not consistently collated, analyzed and disseminated to actors.

New approaches to managing volumes of information using mobile phones, satellite imagery, social networking and volunteerism have reshaped the humanitarian landscape. Live crisis mapping, digital volunteerism, and crowdsourcing information have been more widely used and recognized in recent crisis such as the 2010 Haiti Earthquake, 2011 Japan and 2011 Libya crisis. (UNOCHA, 2011; GFDRR 2010; Nelson A, Sigal I, Zambrano D. (2011). And these experiences helped increase the awareness among policy makers, practitioners and researchers to the potentials for the future. This growing new ecosystem of humanitarians believe these new ways of working can have positive impact on the effectiveness of humanitarian efforts.

This practitioner report describes a recent example of the growing opportunities between humanitarian health organizations and the crisis mapping community. The World Health Organization (WHO) partnered with members of the crisis mapping community to quickly collect information to map Libyan health facilities after the 2011 Libya Crisis. This new collaboration between WHO staff, volunteers, technologists, GIS specialists, health cluster partners and a researcher helped provide health and geographic information to assist the planning phases of an in-depth

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country-wide health facility assessment. Outcomes of this collaboration will aid recovery and reconstructions efforts for the Libyan health system.

DEFINING NEEDS

Before the project began, WHO staff defined the needs and gaps in health service delivery both during the crisis and the post-conflict phases. WHO offices in the Eastern Mediterranean region has attempted in the past to use traditional GIS systems for maps and collected data using GPS receivers. (Al-Shorbaji, 2005). The application of geo-referenced health data has served as a baseline to aid health development work that can easily be drawn upon in the event of an emergency. Post the recent crisis in Libya opportunities to rebuild the health system with the support of WHO and health cluster partners needed to draw upon such baselines in order to define an appropriate recovery strategy. Apart of this effort, health facility maps are an integral part of the baseline information needed for facility assessments and early planning. Specifically, WHO intends to complete a comprehensive health facility assessment in early 2012. Knowing facility locations will help guide where and how teams will deploy to field sites throughout the country. The ultimate goal is to gain insight into the operational capacity and performance of the Libya health system to re-built, reconstruct, and/or enhance facilities where necessary in accordance with the World Health Assembly 58.1resolution. (WHO, 2005b) As part of a long-term strategy, a standardized format of geographically linked health information will place the Libyan Ministry of Health (MoH) in a better position to respond to future emergencies.

Quickly collecting health facility location information over such a large area was going to be difficult because of limited resources and restricted access to insecure areas. As a result the prioritization of early recovery interventions for damaged health facilities has been a work in progress. Planning sessions for the countrywide health assessment began mid January 2012 and a baseline map of existing health facilities would help decision-makers plan the assessment strategy. In humanitarian settings, many health maps use traditional methods of collecting health geographic information such as using proprietary GIS software (e.g., ArcGIS) and directly acquiring geocoordinates with GPS receivers. (WHO, 2005a) But recently the Sahana Software Foundation created a free and open source software hospital management system after the 2010 Haiti Earthquake. On this publically accessible site over 100 health facilities were mapped. (Prustalis, 2010) The team wanted to seek out similar complementary but new methods to address the unique humanitarian challenge.

WHO has an established emergency department with headquarters and regional offices that complement and support the efforts of country offices both for preparedness and in times of crisis. The WHO needed a team of people to help locate as many health facility locations as possible. This would require many people with the interest and time to look for specific information. It would also require specialists to analyze and translate the information into accessible maps. Aware of the [Libya Crisis Map](#), a successful collaboration between the United Nations Office for Coordination of Humanitarian Affairs (UNOCHA) and the Standby Task Force (SBTF), reaching out to the crisis mapping community for support was a promising opportunity.

CONVENING PARTNERS

The WHO convened local health and Libyan actors with three volunteer crisis mapping organizations- [GISCorps](#), [The Standby Task Force](#) (SBTF), and [Humanitarian OpenStreetMap](#) (HOT). A researcher assisted to convene the group and provide strategic advice. Each member brought unique skills to the project.

- Local actors including the Libyan WHO Country Office have been working in Libya before the 2011 crisis. The WHO supports the Libyan Ministry of Health (MoH) in the emergency and recovery phases and as part of the reconstruction process WHO plans to develop a health assessment with country authorities. The WHO, a health cluster lead agency is in also charge of coordinating all the health community's actions in partnership with the MoH.
- [GISCorps](#) coordinates short-term volunteer GIS services to under-served communities and has over 2,500 volunteers from 93 countries. To date it has deployed 272 volunteers to 88 missions in response to disasters around the world.
- The [Humanitarian OpenStreetMap Team](#) (HOT) bridges mapping between traditional response communities and the OpenStreetMap community. Efforts are done both remotely and through fieldwork for disaster response and disaster risk reduction.

- [The Standby Task Force \(SBTF\)](#) with over 600 members from 62 countries has been involved in crisis mapping deployments for Haiti, Chile, Pakistan and Sudan and partnered with UNOCHA to create the Libya Crisis Map.
- A researcher and co-author of the Disaster 2.0 report, affiliated with the Harvard Humanitarian Initiative and Northwestern University also partnered with the above groups. (Harvard Humanitarian Initiative, 2011)

WORK PLAN

The overall objectives of the work plan are to create a compiled layer of Libyan health facility locations from different sources of information. There are four planned stages.

Stage 1 – The WHO GIS specialist compiles and cleans available geographic health facility data from operational organizations.

Stage 2- The SBTF and HOT volunteers collect and curate information primarily from the World Wide Web (Web). Coordinators facilitate these efforts and GISCorps volunteers observe the growing dataset.

Stage 3 - GISCorps volunteers standardize the dataset, further geo-code information, and help provide quality control measures. The researcher analyzes the dataset and provides a quick view of what types of information have been collected.

Stage 4- Volunteers and the WHO GIS specialist will transform data into static and live maps in order to share with the broader network of decision-makers. Communication pathways will be further developed to share information with the wider community. Networks of health providers update the live maps with new health facility information.

INFORMATION FLOWS

After reviewing the needs of the project and understanding roles and expectations among partners, the coordinating team created information workflows (Figure 1). First, available georeferenced datasets were compiled and cleaned by the WHO GIS specialist to create a preliminary dataset. The HOT and SBTF volunteers then searched for health facility information primarily on the Web. These searches included finding facility names, facility types, and city locations. Volunteers specifically searched for health facility geo-coordinates so that the sites could be mapped later in the project. Volunteers working from their homes and offices around the world searched for relevant information during all hours of the day. Information was shared on the Web using shared Google Docs. The first flow of information was held for 4-5 days as the GISCorps volunteers screened the data for duplications, entry errors, and missing geo-coordinates. After performing a necessary quality check, a list of recommended changes were shared with the WHO, researcher, HOT and SBTF members for final changes.

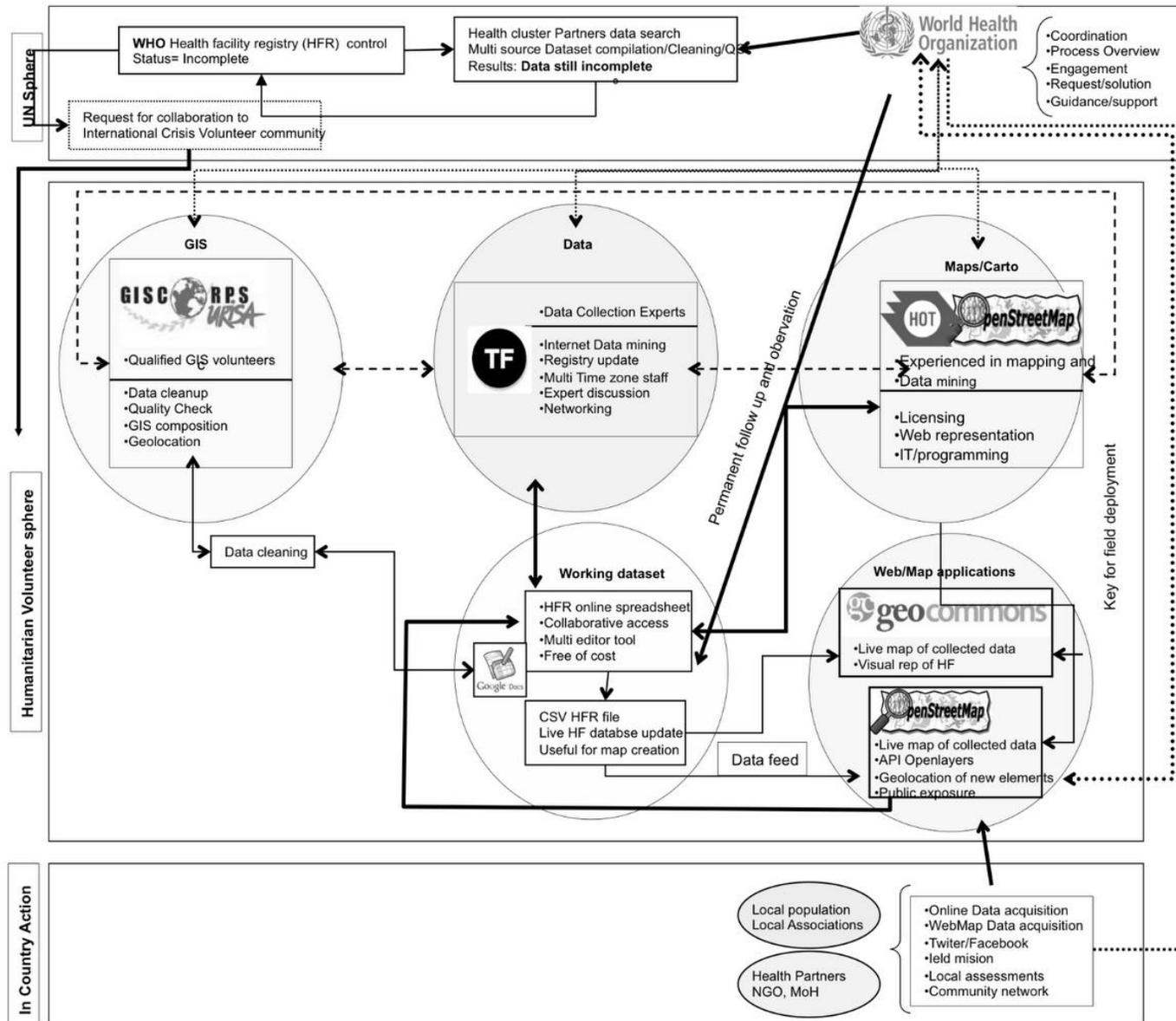


Figure 1 Information Flows
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Methods of collecting health facility information evolved during the project. Rather than waiting for each phase to be completed or the project to end, changes occurred as the needs arose. This allowed for real-time learning and adaptation. Volunteers and the coordinating group communicated with daily Skype chats and emails, which allowed for quick decisions and workflow changes. For example GISCorps members made key recommendations to standardize information at the point of data entry. This was achieved by creating drop down options for specific information such as facility types. (Figure 2)

Unique HF ID	FACILITY NAME	Arabic insert translations pls	SECTOR TYPE	HF Type
HF1	Red Crescent Ajdabiya	الهلال الاحمر الليبي اجدابيا	Public	linic
HF2	Al Mojama clinic	دة المجمة اجداب	Public	linic
HF4	El Mgareaf Hospital	مستشفى المجاريف	Private	ospital
HF5	Ajdabiya Private Clinic	مستشفى خاص	Private	linic
HF6	Ajdabiya Central Hospital	تشفى سنتر اجدابيا	Other	ospital
HF7	Al Abyar hospital	مستشفى الأبيار	Other	ospital
HF8	Al-Aybar Hospital	مستشفى الأيبار	Unknown	ospital
			N/A	

Figure 2 Drop Down Options for Data Entry

CREATING MAPS

At the time of writing this practitioner report maps of health facility locations in multiple formats are being created to fit the needs of decision-makers. Data in comma-separated values (CSV) format has been also been uploaded to the GeoCommons platform for the general public to view. The online OpenStreetMap allows users to interactively see locations. (Figure 3) It will also enable people with ground truth (e.g., from site confirmation or professional knowledge) the ability to identify missing health facility locations and a way to update the map by adding new health facilities online. This live mapping approach aims to allow a large community access to a dynamically changing real-time map. The final product of this WHO collaborative project will be a baseline and updated geographic data layer that will serve as a reference for future health system reconstruction operations with the WHO and the Libyan Ministry of Health.

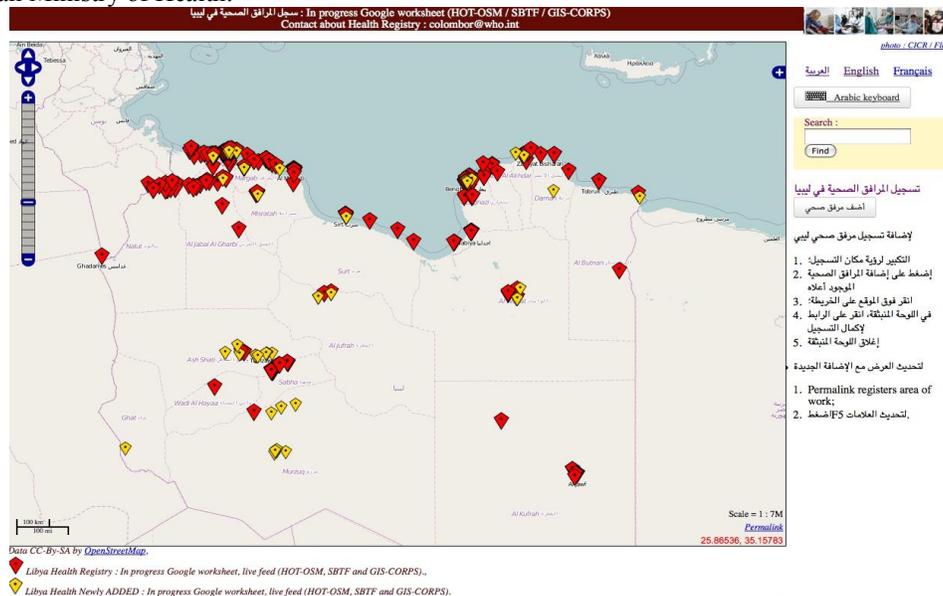


Figure 3 Online Map

COORDINATION

The coordinating group communicated over emails, Skype chats, and phone calls.

Collaborating members:

- Defined information requirements

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- Established roles and expectations
- Addressed practical issues around map use and licensing
- Revised work flows to improve the standardization of health information
- Determined how to best clean and prepare information for map production
- Restructured work flow for volunteers to match the need of decision makers
- Shared ideas on how to best share communicate maps and health information with WHO/Libya health staff

RESULTS

In four weeks SBTF and HOT members identified over 683 health facilities. Over 70 volunteers collected health facility names, city names, geo-coordinates, and other information. The majority of facilities collected were from five locations (Tripoli, Benghazi, Az Zawiyah, Misratah, Sabha). Approximately 90% of identified facilities (n=245) are part of the public sector. (Figure 4) 57% of these facilities (n=575) are hospitals and 25% are clinics. (Figure 5) Fifty percent (n=683) of all health facilities have confirmed geo-coordinates. This percentage will likely increase as volunteers add more geo-coordinates.

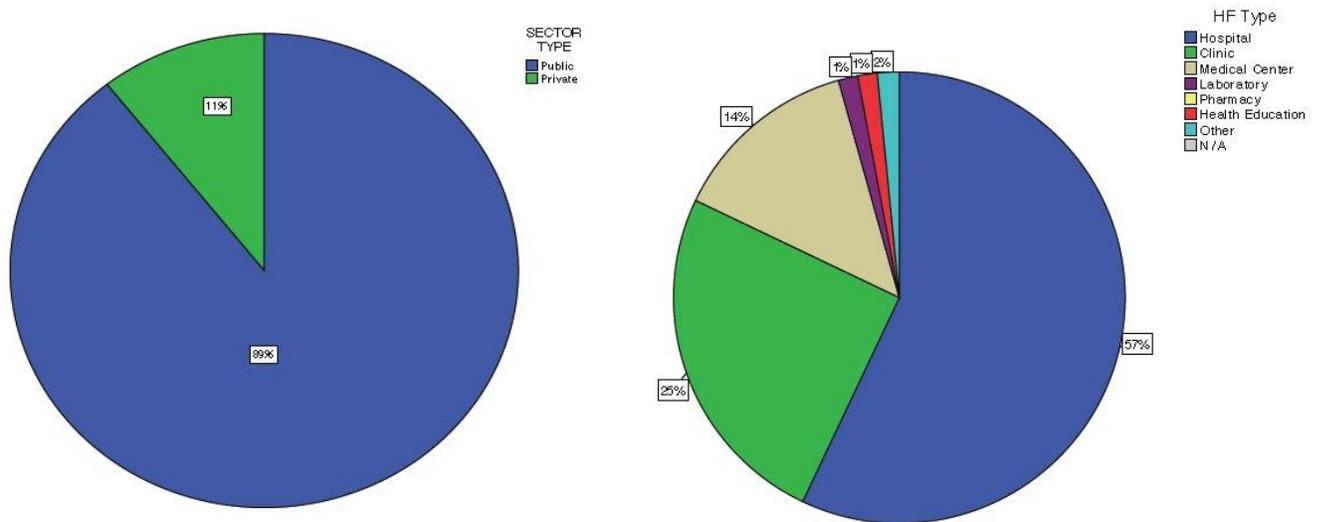


Figure 3 Health Facilities (Public vs. Private)
Figure 4 Health Facility Type

NEXT STEPS

Efforts continue to develop the online map and new points have been added. The WHO continues to share online access and paper maps with decision-makers and planners in Libya who will perform health facility assessments. Ongoing discussions will determine how newly identified facilities can be added to the baseline map during the countrywide health assessment. While plans are being made to share maps online, paper maps may guide field assessment teams with limited electricity and Internet access to find new facilities or confirm locations. Paper maps can also be a powerful capacity building tool when teams interact with local communities. One future approach may be to launch a campaign to engage local communities and citizens to gather and add locally collected locations.

REFLECTIONS

The efforts to further share the maps with the WHO/MoH health facility assessment are ongoing. Overall the collaboration was a success, and this experience provided information to WHO in ways that were difficult to achieve in the past. For the volunteers this exercise helped them to better prepare for future health projects. Organizations were openly able to discuss roles and expectations and continue to learn how to work toward a common goal. Reflections on the experience from their perspective can be found on each agency's blog (HOT, 2012; GISCorps, 2012). The volunteer teams worked together to quickly collect the information and collectively they identified over 600 locations, standardized data types and prepared the information for local validation. Conversations continue on

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how best to validate the volunteer collected information with field assessment teams as well as information added by individuals onto the OSM map.

One of the challenges has been widely sharing the maps in Libya. Internet penetration rate is 5.5%. (ITU, 2010) As a result local actors may have limited access the web map hindering their ability to share their ground truth knowledge of health facility locations. Potential solutions will be to prioritize planning a communication and messaging campaign and transform online maps to paper formats. Recognizing that the success of these objectives are dependent upon key factors such as trust, messaging, validation, and security-- ongoing discussions and planning by the WHO in collaboration with other stakeholders will need to occur in order to further engage the local Libyan community.

Acknowledgments

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