FEATURE

THE BMJ CHRISTMAS APPEAL 2014

How MSF is mapping the world's medical emergency zones

A mammoth project to map the addresses of 200 million people aims to help Médecins Sans Frontières to deliver better medical care worldwide, writes **Jane Feinmann**. The charity has decades of experience in bringing volunteer doctors to where they are needed in emergency situations and longer term humanitarian projects. This is why *The BMJ* has chosen MSF for its Christmas charity appeal this year. Please give generously

Jane Feinmann *freelance journalist, London, UK*

"At long last, the poorest regions of the world will benefit from the lessons of 1854, when John Snow was able to trace the source of a cholera epidemic to a contaminated water pump in Soho [London] by mapping the addresses of his patients," Kiran Jobanputra, Médecins Sans Frontières' (MSF) adviser on non-communicable diseases, told *The BMJ*.

The Missing Maps project, a collaboration between MSF, the British and American Red Cross, and the Humanitarian OpenStreetMap Team, aims to create digital maps to log addresses for the "unmapped or undermapped" people of the world. These are often the poorest and most vulnerable people living in crowded conditions in towns, cities, villages, and refugee camps, says Jobanputra, a general practitioner and deputy director of the Manson Unit, a facility attached to MSF UK in London to help the charity's volunteer doctors on the ground implement evidence based practice.

The project, launched on 7 November, aims to add an ambitious 200 million people's addresses to the maps in the next two years with the help of volunteers worldwide (box).¹

Volunteers and mapathons

Anyone can volunteer their services from the comfort of their own home. But the idea that looks set to take off is for volunteers to work at sociable and technically supportive "mapathons." At one of the first of such events, hosted by the *Guardian* newspaper in London on 7 November, 80 amateur cartographers along with 100 more remote volunteers, put the inhabitants of Baraka, a town in the Democratic Republic of Congo that's endemic for malaria and cholera, on the map. The mapathon traced 5768 buildings, including homes, schools, shops, restaurants, and 1609 roads, on what had been just a pin on the map.

"It's a truly rewarding experience," said Carmen Sumadiwiria, a masters degree student at King's College London, which

organised a mapathon of about 100 volunteers on 24 November and has helped map Ethiopia's Gambella refugee camp, which has a population of 50 000.

"It's a landscape of tents, and we were able to map them all as well as buildings, roads, and water sources," she said. "You're working at your laptop, and each new section that's mapped is put up on a large screen so that you can see the whole area gradually being filled up."

MSF has no doubt that the initiative will transform its work. "When we respond to outbreaks and emergencies, we analyse three key themes: the person (age and sex), the time (how quickly the outbreak is progressing), and the place (geographical spread). But we struggle to understand this third factor well. And without spatial information, we cannot target interventions accurately, making us more reactive than proactive," said Ruby Siddiqui, an epidemiologist at the Manson Unit. "That will now change."

Cholera in Haiti

Jobanputra recalls the moment that he became acutely aware of the importance of spatial epidemiology. He was with the MSF team in Haiti in 2011, responding to constant cholera outbreaks affecting 650 000 people after the 2010 earthquake devastated the island's infrastructure.²

"We had limited resources, and we became aware of how difficult it was to manage with the very sparse descriptions of where people live," he says. "At one level it seemed to be our failure in not listening properly to how people identified the location of their homes, whether it was the distance from a crossroads or whatever. But the truth is that it was almost impossible to get an accurate idea of where they lived."

Tech time: how MSF's volunteers make the maps

Mapping involves four simple steps:

- Existing satellite images are loaded into OpenStreetMap software, a free world map that can be edited by multiple users (a wiki)
- Volunteer amateur cartographers, many enlisted through social media (check #MissingMaps on Twitter), can log in from anywhere in the world and use an easy tool to trace the outlines of buildings, roads, parks, and rivers over the satellite image
- This tracing lacks the names of streets or landmarks so local volunteers, often students or scouts, print out small sections and head out with a pencil to write down the names of streets and buildings
- Once complete, the maps are scanned back into OpenStreetMap and the labels are added to the map by more volunteers. The world then has free access to a validated map forever

“We realised we needed a map to be able to correlate the alerts we heard as well as information about our patients’ origins to something on the ground.”

It was then that Ivan Gayton, MSF’s geographical and information systems consultant, heard about OpenStreetMaps providing a similar service to Google maps in the West. “Above all,” he said at the 7 November launch, “we now have the potential to create maps by and for the people. The dream is to have accurate maps at the beginning of a disaster so that we can get to the most vulnerable people before things go wrong.”

Sleeping sickness

It’s not just in large epidemics that the initiative will help. “We’ve reached a point with something like sleeping sickness where the disease is practically eliminated apart from small pockets of infection that mean it remains a danger,” says Siddiqui. “With proper maps, we may be able to identify areas most at risk and target diagnosis and treatment strategies more efficiently.”

MSF can also create animated maps to show the spatial and temporal nature of a problem. “Ivan [Gayton] has been able to create animated maps to demonstrate how interruptions in the Haiti water network could be linked to spikes in cholera and use this as a way of putting pressure on government agencies to carry out immediate, effective repairs to the network,” she says. “We may be able to do something similar in west Africa because the Missing Maps project has already mapped huge areas to support the Ebola crisis.”

MSF has already noted knock-on effects in the communities that get mapped. “Local people are often surprised that they can access the map free of charge. It brings them a sense of independence, of ownership, and a feeling of involvement and becoming part of their own community’s public health efforts,” says Jobanputra.

“Missing Maps has not required a great deal of funding from MSF,” Jobanputra says. “But the point is that it enables us to deploy funds more wisely. Every doctor is aware of the benefits of spatial epidemiology from John Snow’s example. We have already created maps that will enable teams on the ground to provide a more rapid, more effective, and better planned response to vulnerable communities. This results in more rational use of resources and means that the donations we receive from *The BMJ*’s readers will be used as effectively as possible.”

Competing interests: I have read and understood BMJ policy on declaration of interests and have no relevant interests to declare

If you want to help MSF map the world’s medical crisis zones visit www.missingmaps.org or http://wiki.openstreetmap.org/wiki/Missing_Maps_Project.

Provenance and peer review: Commissioned; not externally peer reviewed.

- 1 Missing Maps launch. <http://new.livestream.com/accounts/719701/events/3521680>.
- 2 Bryson L, Dupuis L, Siddiqui R. Mapping the spread of cholera to aid the MSF response in Haiti. 2013. www.msf.org.uk/mapping-spread-cholera-aid-msf-response-haiti.

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£53 can send a doctor to the field for a day

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