CDC'S WORK WITH INNOVATIVE TECHNOLOGY

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Today we're speaking with Mark Phelan, Humanitarian Analyst, and Mike Gerber, Deputy Branch Chief, who both work in the International Emergency and Refugee Health Branch for the U.S. Centers for Disease Control and Prevention. We'll be talking about two innovative approaches for responding to complex humanitarian emergencies for both sensing technology and health information systems.

First, Mike can you give us a broad overview of why information technology is needed to respond to humanitarian emergencies?

Complex humanitarian emergencies inherently take place in very difficult settings; in areas that might have experienced natural disasters, conflict, war, things that make it very difficult to both collect information, to bring information to other areas where they can be analyzed by decisions makers, and then to simply use information. So different approaches using information technology can close some of these gaps by making it easier to both collect information, to get it to places where it can analyzed, and then to actually do the analysis and then pass the information down to end users of the information.

Can you describe what CDC's unique contribution to this area or response is?

In this field, CDC provides technical assistance for epidemiology and public health issues, to U.N. organizations and to other parts of the U.S. government. And in our work we often play the role as technical advisors in collecting data on nutrition, collecting data on health, and doing the sort of health surveillance that CDC is so well known for. So part of what we do is not only provide the epidemiology but to also try to provide new approaches which can make the entire process better. So in this area we've created an operations research agenda to take information and other technologies to really expand what CDC traditionally does and to make it more effective in these difficult settings.

Can you talk a little bit more about this operations research agenda?

CDC's operations research agenda in this field is operated out of our small branch, and it's really very simple. It's just an approach to constantly look for the latest technologies and for the latest technical approaches that can augment what CDC traditionally does which is public health and epidemiology. So in our field we work with our partners in the public sector, in the private sector, and small moderate governmental organizations to identify new approaches which can augment our traditional work; once again, epidemiology and public health.

Mark, I'm wondering if you could tell us a little bit more about remote sensing technology and how that specifically addresses some of the issues that Mike just described.

Yes. As Mike discussed, when we're in a complex emergency, we're usually talking about a population that has suffered some great shock and usually a large level of displacement where you can have tens or even hundreds of thousands of people that have been uprooted and moved to another area or to another country. Therefore, all the other baseline data, census data that you had previously is no longer valid. And to do any epidemiology to assess the basic health, nutrition conditions of these people, you need a denominator. You need a basic number of the number of people in that area in order to do a survey and have this information to be useful to other people.

Can you describe how the technology works. I mean what types of devices are we talking about?

The project that we're working on, the remote sensing project we're working on which we refer to as a modular pod or as we call it, Modpod, is a device that can be attached to a U.N. helicopter or any other vehicle and actually flown over a populated area, a refugee camp, an internally displaced persons camp, and it uses photography, global positioning system (GPS), information to take pictures and geo-reference them, and that information can be used in the field by decision makers or epidemiologists to put together a map of the area you have and then from that make population estimates to be used for surveys or for planning of health or other humanitarian services.

Has CDC used this technology in the field so far, and if so can you give an example of where we used it?

This general remote sensing technology has been used in the past but its use has been more where there has been commercial imagery that has been purchased and printed out of a refugee camp or an internally displaced persons camp, and that has been used for planning or for general population estimates or for assistance in sampling when you're doing a survey. The problem with commercial imagery is it is very difficult to get it in a timely manner and it is difficult to get it out into the field to the people who need it. So what we are developing is an in-the-field tool to have it use and to apply it and to use it in the field almost instantly. In answer to your question, it has not been used yet. It is still in the development phase. We are very close to doing a test run of this modpod and we hope to test it in the field sometime this year.

Can you describe how remote sensing technology assists in a response for a humanitarian emergency? How does it differ from how data has been collected on a population traditionally or in the past?

In the past, population data has been gathered by almost a census method, an NGO or the U.N. would actually go around and count structures or actual people which as you can imagine in these larger situations, can take weeks if not months and it's also subject

to inaccuracies based on this method and people reporting more people than are actually present. By doing it with remote sensing, it is faster, almost instantaneous so not only can the non-governmental organizations (NGO's) or U.N. get this information quicker, they can make decisions quicker and move this technology back up to country level or headquarter level and get to the donor level where they need to ask for the money quicker and get the resources back to these camps in a more timely manner.

What's important to understand about what we're trying to do, as Mark is describing, is how innovative the approach really is. And we're working very closely with our partners at the Georgia Institute of Technology on this, and it really is very amazing because when people sort of think of inventors, these are the guys you sort of think of – they sit around in rooms and they think of ways of doing things that no one has done before, approaches people just haven't used before. One of their clients, and they described this project to us as we started looking at this entire issue, is the baking industry. To come up with a standard way of making sure, as an example, you have the right number of sesame seeds on every bun, obviously you can't have someone counting these in a scenario where companies are making hundreds of thousands a day. They developed technologies to use images and to use computer programs and computer algorithms to rapidly take an image of a bun and determine how many seeds were on it and then figure out if it needed to be thrown off an assembly line or not. So what this is doing is not just strapping a camera to the bottom of a helicopter or an airplane, but it's getting that imagery, referencing it to a specific point in earth, and then feeding it into a program that will sort of treat a population spread over land like seeds on a bun, to use imagery and a computer algorithms to instantly determine here are the number of people in this photograph. So it really is very interesting and I think it's very innovative and it's a really great example as well of the government and of CDC working with partners in the private sector and in this case with academic institutions.

I can see that the output from a remote sensing technology feeds into a larger health information system which is the other innovative approach we were going to discuss. Can you talk about how the entire system works in response to a humanitarian emergency?

I can. Within the United Nations system, the U.N. High Commissioner for Refugees is the agency that's responsible for refugees around the world, and refugees are classically and legally people who cross over a national border from one country to another. So UNHCR's job around the world, and it's really an unknown figure but there are about 20 million refugees around the world, and UNHCR is responsible for providing support, funding, and for coordinating programs in these populations. And these programs include health programs. So one can imagine the problems you have from a large organization down to the smallest level in a refugee camp of making decisions for programs. So what we're doing is working with the U.N. High Commissioner for Refugees to integrate the basic methods of surveillance and epidemiology to integrate basic things that we all are familiar with like databases or Microsoft Excel or Access, along with very innovative pieces that Mark was describing like remote sensing technologies into a system where in a refugee camp, maybe a camp of 50,000 run by a

small organization, the organization that runs the health service has a standardized way of collecting data, is able to use that data locally to determine if they have specific problems or what their logistics needs are, but then able to shoot a packet of data up regularly to the regional level and then to the national level and then finally to the international level. And this all happens seamlessly and instantaneously. So what that means is from the basic level to the highest level in Geneva or in New York, all the decision makers, whether they're deciding about clinical care for an individual or about funding an international program have data that's live, that's accurate and standardized to make decisions. This program for us has been nine years in the making along with the U.N. High Commissioner and several partners, non-governmental organizations such as the Vietnam Veterans of America Foundation, the International Rescue Committee, and organizations in the private sector as well. So on the most basic level what we're trying to do is integrate traditional methods, integrate paper forms, databases, communications technologies which move data from one place to another in a standardized way so there is an international system that can be used in the refugee camps around the world to collect health data, to analyze it and to distribute findings rapidly. So it really is a system and it depends on both technology, people, organization systems and collaboration with CDC, the U.N. High Commissioner for refugees, and the other organizations which I mentioned.

Can you describe any other types of unique technologies or devices that you're using in the field right now?

Yes, there are a couple other items we're looking at. One is a handheld computer that is called a PDA or personal digital assistant. It is used instead of doing a paper survey where a survey team would have to carry out a large number of paper copies and fill out in pen and pencil questions that they're asking in a camp or a population. It would be put into the handheld computer. This is beneficial for a number of reasons. One, it cuts down on the level of error because the answers are checked. If there is an answer given that doesn't make sense, the computer won't let you put in there and prompts you for another correct answer. The other advantage is that it is, again, timely. Instead of at the end of the survey having to take weeks to do data entry, double data entry, the data is available almost immediately for analysis, and again, that speeds up the process of getting the information out of the field to the people that need it. Another other basic technology that is not very advanced is something very simple, the satellite telephone to allow timely communication from a place in Africa that would have no other communications where you can get information from headquarters here in Atlanta or other places. Or it can also be used to send emails or send data directly from the field instead of waiting a week or weeks before you're back to the capital and you can actually send the data back.

It sounds as though information technologies is going to be used more and more in response to these emergencies, but how do you imagine IT being used for humanitarian relief say ten years from now?

Well, information technology offers great opportunities for the future, and it seems that the possibilities are endless. The problem is that it is developed here in a perfect world so to speak where the data and infrastructure to support it is also quite well developed. The problem is when you take this information technology into the field, you're working in very imperfect situations and it's important for the people that are developing it to have a real understanding of the harsh conditions in the field that it will be used in. And keep it simple and keep it durable so it can be used in these situations without the support that it has back here in the United States or other developed countries.

What Mark is describing is exactly right. Obviously the Centers for Disease Control is not out there as an organization or an agency that makes computers or makes handheld devices. We're a public health agency, so what we're really doing is figuring out a way to strike the balance between technology being beneficial and technology being a barrier because it's simply too complicated to be used in a situation which is already very complicated. So the operations research we're doing looking at all these things is not just to build them and not just identify what's useful but to identify what's usable, what strikes that balance between value added and between being a challenge because it's too complicated.

Finally, can you describe a specific example where you saw the value added of IT in response to an emergency?

When we went to Darfur to do a Darfur-wide nutrition and mortality survey with the U.N. World Food Program, it was early in the crisis and again the information on populations in a number of these camps was very questionable because it was still influx. We were able to get, before we went out into the field, a number of satellite images of these camps, and when we get out to the field, of course there was a big question of how many people are in these camps and how can we do the sampling in these camps to get the baseline information. Having these satellite images were incredibly useful because we were able to use them to divide the camp into areas and do basic population estimates from them. And on the other side when we showed these images to the NGO's and to the U.N. working in the field, they literally fought over these images because they were so useful to them not only for the population information but it showed spatial information, it showed population based around a water point, population around a clinic, and they used this to plan services accordingly. Another example was they noticed from one of these images that they could see from the sky what they couldn't see from the ground was that the wadi, or the riverbed, was dangerously close to a large population area, and although it was fine at that point, in another month when the rains came they realized that would be a big problem as far as just flooding and of course the many health problems that come with water and sanitation and the latrines that were in that area. So they had planned from these images to move this population away from the riverbed.

Interesting. Well thank you. Again, we've been speaking with Mark Phelan, Humanitarian Analyst, and Mike Gerber, Deputy Branch Chief from the International Emergency and Refugee Health Branch, U.S. CDC.

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