Defining Electronic Health Technologies and Their Benefits for Global Health Program Managers

Crowdsourcing

Crowdsourcing conflates the words "outsourcing" and "crowd." It appears to have been introduced in print by *Wired* magazine in 2006 (1) to describe an approach to accomplishing a task by soliciting input from the public, or a specific subset of the public. Since then, both the word and the concept have been applied in many contexts.

Broad global access to the Internet and mobile phone networks has expanded the potential size of "the crowd" far beyond what was possible with traditional communication tools a decade ago (2, p. 187). Today, one can engage a huge, often geographically disperse group of individuals through social media (Twitter, Facebook, etc.), text message and mobile phone applications, websites and games on the Internet, or through other Internet- and cloud-based platforms. These people can help accomplish discrete tasks for a small fee or free of charge.

Tasks suited to crowdsourcing tend to fall into the following categories (3):

- Knowledge discovery and management: finding and compiling information in a common location and format (e.g., disease outbreak reporting; customer feedback on a facility or service)

- Distributed human intelligence tasking: preparing or analyzing large amounts of information (e.g., translating tweets post-earthquake to understand a current situation; tagging shapes in digital images in preparation for data analysis)

- Broadcast search: solving empirical problems (e.g., identifying novel solutions to sanitation in the developing world; developing new designs for specific products)

- Peer-vetted creative production: creating and selecting creative ideas (e.g., selecting sites for public services; developing themes for social marketing campaigns)

With broad global access to the Internet and mobile phone networks, a huge number of people can be engaged to work on discrete tasks

Crowdsourcing

MEASURE Evaluation/Strategic Information for South Africa is currently working with the South African Department of Heath on MomConnect, a project working to improve the coverage and quality of antenatal maternal health services. The project uses SMS cell phone technology to send pregnancy stage-based messages to support the mother and her baby during the course of her pregnancy, childbirth, and up to the child's first birthday. The system is also using crowdsourcing to solicit feedback (ratings, compliments, and complaints) on public health services and direct it to a central communication center.

What Can Crowdsourcing Do for Global Health Program Managers?

Crowdsourcing has been used increasingly in global health. All four types of crowdsourcing have been applied, but crowdsourcing for knowledge discovery appears to be most promising as a tool to facilitate the management of health programs globally.

One example is presented in a journal article published in 2012 (4). It reported that anonymous players of an online game that challenged them to analyze blood smears to diagnose malaria achieved an accuracy rate of over 99 percent. The information thus generated not only helped patients receive treatment but also targeted areas of high malaria acquisition for future malaria prevention programs.

Another example comes from Kenya. The Ushahidi website was developed in 2008 using open source technology to track and respond to ethnic violence around the elections. The site's team of volunteers collected email and text messages and tweets from average citizens reporting their eyewitness accounts of violence. The team verified this information and uploaded it on Google Maps, to show citizens safe and dangerous areas in Nairobi. Huduma expands the Ushahidi platform, soliciting crowdsourced data on education, governance, health, infrastructure, water, and justice. In the health domain, users can send texts, email, or tweets to comment on the delivery of health services in their area. This interactive tool serves as a clearinghouse for this data, with a dashboard that makes it possible to compare one district with another. The Ushahidi team plans to add information on donor aid to the dashboard, so a visitor to the site can pull up the profile of a specific clinic and see what aid the clinic has received, as well as local reports on whether the doctors and nurses on its staff are on the job. This new information can help health program managers in Kenya understand which facilities need targeted support to improve service delivery (5).

> Crowdsourcing reduced the time to deliver reports on Ebola cases to Liberia's health ministry from 5 days to instantly

Ushahidi has supported information gathering through crowdsourcing in other health-related humanitarian disasters, as well. During the Ebola outbreak in West Africa, humanitarian workers used Ushahidi to share information about the epidemic, allowing emergency responders to mobilize faster than traditional communication channels would allow (6). For instance, in Liberia, Ushahidi set up volunteers at an emergency dispatch unit who fielded phone calls on all potential Ebola cases (where they were reported and where they might have been contracted). Using Ushahidi, the volunteers entered information online and disseminated it through emails and texts. Ministry of Health staff managing the response to the epidemic could then review the updates immediately—presented both in tables and on Google Earth maps. This reduced the time it took to get reports on Ebola cases to the Ministry of Health from five days to instantly. It also allowed officials to make more-informed decisions about where to provide more supplies and human resources based on the Ebola caseload (6).

For more information on the Ebola and Huduma examples, go to:

Ebola: http://www.npr.org/sections/goatsandsoda/2015/03/25/394266190/how-did-ebola-volunteers-know-where-to-go-in-liberia-crowdsourcing

Huduma: http://www.theguardian.com/global-development/poverty-matters/2011/may/19/crowdsourcing-good-use-in-africa

For more information on the potential application of crowdsourcing to public health, go to: http://www.ajpmonline.org/article/S0749-3797%2813%2900589-8/abstract

For more information on MEASURE Evaluation, visit:
www.measureevaluation.org.

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ALL ABOUT eHEALTH

Electronic health (eHealth) refers to the health sector's use of information and communication technologies (ICT) such as mobile phones, portable and handheld computers, Internet and cloud-based applications, open source software, and data warehouses. Advances in ICT have increased exponentially the amount of data that health information systems can collect, synthesize, and report. Expansion of these technologies in low- and middle-income countries (LMICs) promises to revolutionize the global health sector's response to these countries' most pressing health issues.

MEASURE Evaluation—funded by the U.S. Agency for International Development—seeks new ways to exploit such eHealth solutions as data dashboards and geospatial data analysis, as part of its mandate to strengthen health systems in low-resource settings. Even though health program managers in LMICs—as everywhere—are increasingly expected to use and invest in such strategies, many lack information about how the strategies work and how they can benefit the management of health programs.

To address this problem, we developed this glossary of eHealth strategies most likely to enhance data access, synthesis, and communication for health program managers at all levels of a health system who are eHealth novices. The list has been vetted and revised by an advisory group representing the World Health Organization, the Free University of Free Brussels/European Agency for Development and Health, the University of Oslo, the Public Health Foundation of India, and the National Institute of Public Health Mexico.

The complete set consists of fact sheets on the following eHealth strategies, in addition to this one:

- **Dashboards**
- **Hackathons**
- **Open data**
- **Big data and data science**
- **Geospatial analysis**
- **Integration and interoperability**
- **App competitions**

In each fact sheet, you'll find the following information:

- eHealth strategies that have been used in health information system strengthening efforts to improve access to and synthesis, presentation, and communication of health data for program management

- How the strategies have been adapted (or not) from their application in resource-rich country settings to health programs in LMICs

- An example of the strategy for global health program management

- Links to additional resources for more in-depth details on the strategies