

Training During Emergency Response to Build Resiliency in Water, Sanitation, and Hygiene

Lee Boudreau, Ash Kumar Khaitu, Laura A. S. MacDonald

Abstract—In April 2015, a magnitude 7.8 earthquake struck Nepal, killing, injuring, and displacing thousands of people. The earthquake also damaged water and sanitation service networks, leading to a high risk of diarrheal disease and the associated negative health impacts. In response to the disaster, the Environment and Public Health Organization (ENPHO), a Kathmandu-based non-governmental organization, worked with the Centre for Affordable Water and Sanitation Technology (CAWST), a Canadian education, training and consulting organization, to develop two training programs to educate volunteers on water, sanitation, and hygiene (WASH) needs. The first training program was intended for acute response, with the second focusing on longer term recovery. A key focus was to equip the volunteers with the knowledge and skills to formulate useful WASH advice in the unanticipated circumstances they would encounter when working in affected areas. Within the first two weeks of the disaster, a two-day acute response training was developed, which focused on enabling volunteers to educate those affected by the disaster about local WASH issues, their link to health, and their increased importance immediately following emergency situations. Between March and October 2015, a total of 19 training events took place, with over 470 volunteers trained. The trained volunteers distributed hygiene kits and liquid chlorine for household water treatment. They also facilitated health messaging and WASH awareness activities in affected communities. A three-day recovery phase training was also developed and has been delivered to volunteers in Nepal since October 2015. This training focused on WASH issues during the recovery and reconstruction phases. The interventions and recommendations in the recovery phase training focus on long-term WASH solutions, and so form a link between emergency relief strategies and long-term development goals. ENPHO has trained 226 volunteers during the recovery phase, with training ongoing as of April 2016. In the aftermath of the earthquake, ENPHO found that its existing pool of volunteers were more than willing to help those in their communities who were more in need. By training these and new volunteers, ENPHO was able to reach many more communities in the immediate aftermath of the disaster; together they reached 11 of the 14 earthquake-affected districts. The collaboration between ENPHO and CAWST in developing the training materials was a highly collaborative and iterative process, which enabled the training materials to be developed within a short response time. By training volunteers on basic WASH topics during both the immediate response and the recovery phase, ENPHO and CAWST have been able to link immediate emergency relief to long-term developmental goals. While the recovery phase training continues in Nepal, CAWST is planning to decontextualize the training used in both phases so that it can be applied to other emergency situations in the future. The training materials will become part of the open content materials available on CAWST's WASH Resources website.

L. Boudreau and L. A. S. MacDonald are with the Centre for Affordable Water and Sanitation Technologies, Calgary, Alberta, Canada (e-mail: lboudreau@cawst.org, lmacdonald@cawst.org).

A. K. Khaitu is with the Environment and Public Health Organization, Kathmandu, Nepal (e-mail: ashkumar.khaitu@enpho.org).

Keywords—Water and sanitation, emergency response, education and training, building resilience.

I. INTRODUCTION

ON April 25, 2015, a magnitude 7.8 earthquake struck Nepal on 25 April 2015, killing approximately 9,000 people and injuring over 17,000. An additional 2.8 million people were displaced as a result of the destruction of 450,000 homes [1]. The earthquake was followed by significant aftershocks, with the most significant aftershock of magnitude 7.3 taking place on 12 May. The earthquake and its aftershocks caused extensive damage to existing water and sanitation service networks. The combination of this damage with the displacement of large populations led to a high risk of adverse health impacts from diarrhoeal diseases that could persist long after the initial earthquake and aftershocks [2]. In humanitarian crises such as this, outbreaks of diarrhoeal disease are common; specifically, in the acute and early recovery stages, these diseases can account for more than 40 % of all deaths and upwards of 80 % of deaths in children less than two years of age [3].

Because of these risks during the acute and recovery phases, there was – and there continues to be – a need to fortify existing WASH services; replace or repair those that are no longer working; and develop and deliver additional, appropriate WASH services to meet the emerging needs of those affected. In addition to implementing appropriate WASH hardware, WASH software (i.e. awareness-raising and educational support) is necessary for building the technical capabilities, adaptability, and resilience of local implementers and community members. Doing so will improve the effectiveness and sustained use of new and rehabilitated WASH services. An example of WASH hardware implemented after the earthquake and the importance of providing WASH software to accompany it was liquid chlorine for household water treatment (HWT). Research on the distribution of HWT in acute emergencies has found that in order for effective use of HWT to occur, a population needs to be familiar with an introduced product, willing to use it, and trained in its use [4].

ENPHO, a Kathmandu-based non-governmental organization, identified the need for increased WASH awareness and for WASH software to accompany WASH hardware and product distribution. From their work in the affected communities immediately following the earthquake, ENPHO quickly recognized that these needs were largely unaddressed in earthquake relief activities:

“We realized very quickly that no one was working on WASH awareness. Earthquake affected communities were receiving support from various aid organizations but there was no information to go with it. People had hygiene kits but didn’t know what to do with them... They had emergency toilets but didn’t know anything about sanitation or why it was important. Piyush (liquid chlorine for water treatment, produced by ENPHO) was being distributed by many different organizations but without the education for people to understand proper doses.” – Rameswor, ENPHO, WASH Trainer

Having identified these needs, ENPHO worked with the CAWST, a Canadian education, training and consulting organization, to develop two WASH volunteer training programs that addressed the lack of WASH awareness and software. The two trainings that were developed were intended for the two key phases in emergency response: the acute phase and the recovery phase.

Here, we describe the process by which ENPHO and CAWST developed, piloted, delivered, and improved the emergency WASH volunteer trainings. In the following sections, we set out the training objectives, present the methodology and preliminary results of the workshops, discuss lessons learned, outline next steps, and provide recommendations.

II. OBJECTIVES

ENPHO and CAWST’s objectives for training on WASH, both in the acute emergency response and the longer term recovery phase, were to develop education and training programs to enable community volunteers to respond to WASH needs as part of earthquake relief efforts.

The overall training objectives were to:

- 1) Provide volunteers with information on local WASH issues, their link to health, and their increased importance after the earthquake.
- 2) Ensure that volunteers understood the WASH information to the point that they would be able to:
 - a) Teach WASH awareness and instruct others on how to use available WASH options.
 - b) Apply their knowledge when giving advice on WASH related challenges in affected areas.

The development of the acute phase training was initiated shortly after the earthquake and was first delivered to community volunteers within two weeks of the initial earthquake, with trainings continuing for about five months. The objective of this two-day workshop was to prepare community volunteers to educate and train others affected by the disaster. A key focus of the workshop was to give volunteers the knowledge and skills needed to formulate useful WASH advice in the unpredictable circumstances they would encounter in affected areas.

The second training was developed to enable volunteers to effectively advise people on WASH practices to continue to keep themselves and their communities healthy and prevent the transmission of diarrheal disease during the recovery phase. This three-day workshop was intended to facilitate a

transition from meeting urgent WASH needs in the period immediately following the earthquake to planning and providing for ongoing WASH needs during recovery and the transition to longer-term sustainable solutions.

III. METHODS

This section describes the methods used to develop the two workshops. The education program development process was fast-tracked because of the immediate need for training after the earthquakes and the short timeframe to develop these trainings. This development process relied on a framework modelled after the ADDIE model of instructional design [5]. The ADDIE approach is informed by active learning and the theory of educational constructivism and is based on applied experience, all three of which are core features of adult learning [6]. Each workshop consists of relevant information, practical components, participatory activities, and a variety of discussion types to allow participants to share their experiences.

A. Acute Phase Training

Within the first week following the earthquake, CAWST and ENPHO began to develop the acute phase workshop. This process consisted of the following steps.

- 1) *Identify Needs:* Immediately after the earthquake, many local community members approached ENPHO to learn how they could contribute to the emergency response. ENPHO realized the potential for community volunteers to help people in affected areas by distributing not only WASH hardware, such as liquid chlorine for HWT, but also by sharing WASH information. To do this effectively, however, volunteers would need sufficient, appropriate training before working in affected communities.
- 2) *Develop Workshop:* ENPHO then drafted an outline that set out the workshop’s target audience, the local situation, and the training needs. After reviewing this information from ENPHO, CAWST collected information and resources on WASH emergency response, adapted lessons from existing WASH training programs, and developed new lessons to fill any gaps in content. CAWST’s technical staff with prior experience in emergency response shared key learnings from their experience, which was vital to ensuring that the lesson plans and participant materials that were developed were appropriate to the context. Program developers were selective when it came to deciding what information would be included in the workshop so that key facts stood out and would be remembered easily by the volunteers.

ENPHO and CAWST worked closely and collaboratively, which was vital to the iterative, adaptive workshop development process. Such close collaboration was difficult to achieve due to unreliable power and communications systems in Nepal, as well as ENPHO’s many other priorities for earthquake response at that time, but the commitment of both organizations ensured success.

- 3) *Pilot and Revise Workshop*: On May 6th, only 10 days after the initial earthquake, ENPHO piloted the first version of the workshop. They then shared feedback from the workshop pilot with CAWST, and together, the team modified the workshop lesson plans.
- 4) *Deliver Finalized Workshop*: ENPHO started delivery of the finalized acute phase workshop on May 11th and continued to hold trainings for five months. The finalized version of the workshop consists of 10 lesson plans delivered over two days. These lesson plans cover the following topics:
 - WASH in Emergencies
 - Working with People in Emergencies
 - Disease Transmission and Blocking
 - Water Quality in Emergencies
 - Emergency Sanitation
 - Emergency Hygiene
 - Coordinating for Support
 - Tools for WASH Volunteers

Lesson plans are supported by participant materials, such as posters, an emergency WASH checklist, a field kit checklist, and a healthy WASH self-assessment form.

B. Recovery Phase Training

While delivering the acute phase training, ENPHO and CAWST started to develop a second workshop focusing on WASH services and awareness during the recovery phase. The interventions and recommendations in this training were intended to support the transition between stop-gap measures taken during the acute phase response and long-term WASH solutions, linking emergency relief strategies to long-term development goals [7].

- 1) *Identify Needs*: As acute phase training, ENPHO trainers realized that the needs of earthquake affected communities were quickly evolving as relief efforts progressed. They recognized that volunteers would need different training to be able to support communities during the recovery phase.
- 2) *Develop Workshop*: Together, ENPHO and CAWST modified the acute phase training content and added new content to address the longer term WASH needs of earthquake affected communities. This development process relied on feedback and experiences from trainers on the acute phase training delivery and from volunteers on their work in camps and the changing conditions and needs in these camps. Some examples of differences between the acute phase and the recovery phase trainings include:
 - a) For the acute phase, HWT lessons emphasized the correct and consistent use of liquid chlorine, which was widely distributed post-earthquake. For the recovery phase, volunteers were trained to cover the full multi-barrier approach to safe water and to explore multiple HWT options.
 - b) In the acute phase training, sanitation messaging focused on temporary pit or trench latrines, while the recovery

- c) From the acute phase training to the recovery phase training, content on hygiene was expanded to include not only handwashing but food hygiene, menstrual hygiene, and broader concepts of healthy homes and communities.
- 3) *Pilot and Revise Workshop*: The recovery phase workshop was piloted in September 2015. The workshop was revised and finalized based on feedback from the pilot.
- 4) *Deliver Finalized Workshop*: ENPHO began delivering the finalized recovery phase workshop in October 2015, and delivery is ongoing as of April 2016. The three-day workshop consists of 13 lesson plans – and associated support materials – that cover the following topics:
 - WASH in Emergency Recovery
 - WASH Behaviours and Disease Transmission
 - Responding to Diarrheal Disease
 - Water Quality and Point of Use Treatment Options
 - Encouraging Latrine Use
 - Waste Management
 - Emergency Hygiene
 - Healthy Homes and Communities
 - Coordinating for Recovery Activities
 - Monitoring WASH Indicators and Record-Keeping
 - Delivering Key WASH Messages

IV. RESULTS

From March to October 2015, ENPHO trainers delivered 19 acute phase workshops to over 470 volunteers. Between October 2015 and February 2016, trainers delivered 10 recovery phase workshops to an additional 226 volunteers. These volunteers helped rehabilitate community latrines and water supply systems, produced and distributed liquid chlorine, distributed hygiene kits, and facilitated health messaging and WASH awareness activities in affected communities. Through these activities, volunteers extended ENPHO's reach in conducting relief activities, as they were able to provide support to 11 of the 14 earthquake-affected districts. ENPHO also partnered with other organizations involved in the relief efforts, including UNICEF, Plan, Oxfam, WaterAid, and MercyCorps. Delivery of the recovery phase training is ongoing as of April 2016.

Volunteer feedback on both workshops has been very positive overall. Some 77 % of participants in the acute phase training reported that it completely met their expectations. One participant, Hari Sundar Shrestha from the Liwali camp described it as "very relevant," saying that "the workshop is the burning issue of the camp." Participants also valued the well-designed curriculum and how it addressed the real needs of earthquake-affected communities and emergency response organizations. Maya Thapa, a Team Coordinator for the Shangrila Reconstruction and Development Project, said of her decision for her organization to be trained by ENPHO:

"We looked at training manuals provided by other agencies, and in the end we were so impressed with the Emergency WASH curriculum provided by ENPHO. It

was designed and explained very well... It fits very well with our needs and our communities' needs. ENPHO really focuses on needs-based curriculums."

As for feedback on how to improve the workshop, participants said that: (1) greater depth on certain topics would prepare them to make better recommendations; (2) a more hands-on component would be useful; and, (3) more handouts and posters targeted to the emergency and recovery context would benefit the program. This feedback will be incorporated in future versions of the workshops.

CAWST and ENPHO acknowledge the limitations of the current available evidence on the effectiveness of WASH interventions in emergencies and recognize that more high quality studies are required [8]. A significant limitation in assessing the results of the two training programs presented here is that the data collected for this program was restricted to the number of volunteers trained. As a result, there is little data available on how many earthquake-affected people have benefited from the training programs and volunteer activities, as well as the contribution the volunteers made towards improving the health of those affected by the earthquake, distinct from the inputs of other relief activities.

V. CONCLUSION

A. Lessons Learned

After the earthquake, ENPHO realized that its existing volunteers had a strong desire to help their community members in need. By training and mobilizing these volunteers, ENPHO was able to reach many more communities in the immediate aftermath of the disaster than if they had relied on staff alone.

ENPHO and CAWST collaborated closely during workshop development and relied on an iterative process to continue to improve the training content and support materials. This process was made possible by frequent, open communication, enabling CAWST to improve and expand upon the draft content and incorporate updates from ENPHO as they arrived. This allowed ENPHO and CAWST to develop the acute phase workshop within a short response time. Such close collaboration was possible due to ENPHO and CAWST's 10-year working relationship. During this time, CAWST staff has worked with ENPHO's staff and trainers to develop their training and education program development skills. As a result, ENPHO has a strong in-house team that can quickly identify and analyse WASH needs and design education and training programs to address those needs. Because of this skill-set, the ENPHO team was able to quickly pivot from regular program activities to the initial development of emergency training content. This experience highlighted the importance of developing long-term partnerships and mentoring within these partnerships to achieving successful collaboration. It also made clear the need to better link relief assistance to ongoing development work in order to effectively address the evolving WASH needs of communities and foster long-term resilience in these communities. Further, emergency relief aid needs to be locally appropriate, and the

hardware distributed needs to be supported by software to train users. Local development organizations are well-positioned to provide the initial education and training to complement relief interventions and their continued presence positions them well to provide ongoing support as aid organizations exit and the transition is made from emergency response to recovery to development.

B. Next Steps

While the recovery phase training continues in Nepal, CAWST plans to disseminate the training and support materials to other CAWST partners to be adapted to the partners' local context. For example, CAWST's partner in Cambodia – Church World Service – plans to adapt the materials to focus on frequent flooding, the WASH challenges that result from this flooding, and the activities that can be undertaken to address these issues. CAWST also plans to assess the feasibility of decontextualizing the training and support materials so they could be more widely circulated. Once decontextualized, the materials would be made CAWST's WASH Resources website as part of the suite of CAWST's open content online education and training materials.

ENPHO and CAWST will continue to incorporate feedback from the training programs to improve the workshops. Building upon these experiences and initial results, CAWST and ENPHO are seeking funding opportunities for WASH interventions and programming to address long-term recovery and reconstruction needs within severely affected areas of Nepal.

C. Recommendations

Moving forward, CAWST recommends that: (i) high-quality research be carried out to expand the evidence base on the impact of WASH interventions in emergencies and humanitarian crises; (ii) development organizations planning to develop programming on emergency WASH put together a team that is strong not only in technical WASH, but also in education program development to meaningfully and effectively structure interventions through the different phases of emergency response; and, (iii) aid organizations, organizations working in Disaster Risk Reduction, and development organizations coordinate longer-term and joint planning to achieve greater impact.

REFERENCES

- [1] UN Dispatch. "Nepal earthquake facts and figures," 2015. Accessed online: <http://www.undispatch.com/nepal-earthquake-facts-and-figures/>
- [2] J. T. Watson, M. Gayer, and M. A. Connolly. "Epidemics after natural disasters," *Emerging Infectious Diseases*, vol. 13, no. 1, 2007.
- [3] SHARE Research Consortium. *Evidence Review and Research Priorities: Water, Sanitation and Hygiene for Emergency Response*. London, UK: SHARE, 2012.
- [4] D. S. Lantagne and T. F. Clasen. "Use of household water treatment and safe storage methods in acute emergency response: case study results from Nepal, Indonesia, Kenya, and Haiti," *Environmental Science and Technology*, vol. 46, no. 20, pp. 11352-11360, 2012.
- [5] R. M. Branch. *Instructional Design: The ADDIE Approach*. Boston, MA: Springer, 2010.

- [6] M. Knowles, E. F. Holton, R. Swanson. *The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development*. Burlington, MA: Elsevier, 2005.
- [7] I. Mosel and S. Levine. *Remaking the Case for Linking Relief, Rehabilitation and Development*. London, UK: Humanitarian Policy Group and Overseas Development Institute, 2014.
- [8] A. Ramesh, K. Blanchet, J. H. J. Ensink, and B. Roberts. "Evidence on the effectiveness of water, sanitation, and hygiene (WASH) interventions on health outcomes in humanitarian crises: a systematic review," *PLOS ONE*, vol. 10, no. 9, 2015.