

Household Water Treatment and Safe Storage In Emergencies Implementation Case Study: *Gadyen Dlo* (Sodium Hypochlorite Solution) and *Aquatabs* (NaDCC Tablets)

DEEP SPRINGS INTERNATIONAL (DSI), HAITI

Introduction

Deep Springs International (DSI) is a US based not-for-profit organization whose mission is to save lives in Haiti by promoting local production and distribution of household chlorination systems under the brand *Gadyen Dlo* (“*Water Guardian*” in Kreyòl).

The *Gadyen Dlo* brand was developed in 2002 as part of the Jolivert Safe Water for Families project, by the US Centre for Disease Control and Prevention (CDC) and the non-governmental organization Missions of Love. DSI has managed the project since 2008.

Gadyen Dlo is based on the CDC Safe Water System, which consists of three elements:

- Water treatment in the home using a chlorine solution (sodium hypochlorite)
- Storage of water in a safe container
- Education and behaviour change communications to improve hygiene and water handling practices



Gadyen Dlo System
(Credit: scientificamerican.com)

The Emergency Situation

Haiti is the poorest country in the Americas, and suffers from political instability, environmental degradation, food insecurity and frequent natural disasters, including hurricanes, floods and earthquakes.

On January 12, 2010, a 7.0 magnitude earthquake struck 17 km southwest of Port-au-Prince, the capital city.

The earthquake directly affected 3 million people in Port-au-Prince, Léogane, Petit Goave, Grand Goave and Jacmel, causing over 222,570 deaths and 300,572 injuries. Widespread destruction in Port-au-Prince left over 1.5 million people homeless. Many of the people displaced from Port-au-Prince resettled in over 1,354 spontaneous settlement sites across the earthquake-affected area, with 661,000 people fleeing the capital for rural areas. The earthquake compounded pre-existing problems of severe poverty, low development and very limited access to education, health, and water and sanitation services (OCHA, 2011).

Prior to the earthquake, *Gadyen Dlo* and water containers were being manufactured and distributed in several locations throughout the country, including Léogane, which is in the earthquake affected area. DSI responded to the need for safe drinking water in the acute emergency by distributing containers, *Gadyen Dlo* sodium hypochlorite solution and *Aquatabs* brand sodium dichloroisocyanurate (NADCC) tablets. During the emergency, they partnered with Save the Children to distribute *Aquatabs* and containers to a target of 15,000 households in Léogane, covering 20% of urban and 80-90% of rural families.

Communities targeted for distribution in Léogane were in areas not serviced by other emergency responders, who tended to work in more densely populated urban centres. DSI selected more remote areas, where

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access to tanker truck water and other improved water sources was not as readily available. The affected population in the DSI project areas had largely had their homes destroyed in the earthquake, but had chosen to live in temporary locations near their destroyed houses or with neighbours. There were fewer resettlement camps in these areas than in the urban areas, and although DSI did do some distribution in camps, the majority of recipient households were in more dispersed, rural areas.

As of February 2010, DSI had reached 2,880 new families with safe storage containers and *Aquatabs* (Lantagne and Clasen, 2011). By May 2010, they reached 15,200 families. The numbers reached through the emergency response were built upon through the subsequent years, and by February 2012, the number of families reached in Léogane alone has risen to 19,230.

During the emergency, DSI also provided *Gadyen Dlo* chlorine solution to more than 1,000 households in the earthquake-affected Grand Goave area. These households had already been using the product prior to the emergency, as part of a DSI program working with local parish churches in the area.

Creating Demand

Before the earthquake, several household water treatment and safe storage (HWTS) options were promoted in Haiti. DSI had been distributing *Gadyen Dlo* for several years before the earthquake struck. Their target population was households without access to an improved source of water and with children under the age of five. Prior to the earthquake, in the Léogane area DSI distributed locally manufactured safe storage containers and *Gadyen Dlo* via 35 Community Health Workers (CHWs) to 1,500 families in 50 communities (Lantagne and Clasen, 2011).

People were already familiar with using chlorine to treat their drinking water, so they were receptive to the option after the earthquake. Chlorine is highly accepted in Haiti and there are generally no objections to the taste and smell (Lantagne and Clasen, 2011). Building upon local practices

was important to the success of DSI's program. Because chlorine products were familiar and accepted in Haiti prior to the emergency, their use during the emergency required less training or promotion.

The promotion campaign included printed calendars with product instructions and pictures, radio spots, branded t-shirts for families, branded equipment (hats, t-shirts, folders, backpacks) for CHWs, community events, banners, murals, and more. After initial training and promotion in the communities, CHWs conducted household visits. During these visits they distributed the products, checked chlorine use at the home, and encouraged continued use.



Public promotion of *Gadyen Dlo* (Credit: DSI)

Which households received chlorine systems was left up to the CHWs, but they were instructed to target households with no access to improved water sources. Due to the nature of the emergency response, and the increased demand for safe water in general, targeting of recipient households was not as rigorous during its emergency response as in DSI's ongoing programs. In some communities, total coverage was achieved during the emergency, which is a positive step for getting safe water to these communities on an ongoing, sustainable basis after the emergency.

Supplying Products and Services

Distribution in Léogane

The safe water containers distributed by DSI during the emergency were manufactured locally by the supplier they used for their ongoing *Gadyen Dlo* projects. Fortunately the factory was not damaged in the quake, and had a stockpile of a few thousand

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buckets at the time of the quake. DSI trucked thousands of buckets from Port-au-Prince to Léogane, fitted them with lids and spigots, and were able to start distributing containers and chlorine solution within a week of the quake. The bucket manufacturer was able to commit to producing the remaining buckets to reach the target of 15,000, which provided jobs for the factory staff during the difficult time following the earthquake.



Assembling containers (Credit: DSI)

In Léogane, containers and *Aquatabs* were distributed to households for free between January and May 2010.

The *Aquatabs* were purchased from Medentech by DSI and imported into Haiti via volunteer small planes landing on makeshift airstrips throughout the country (Lantagne and Clasen, 2011). The order for the *Aquatabs* was placed within 3 days of the earthquake. Once the tablets arrived in Haiti, they were stored in a warehouse DSI shared with other emergency response partners. DSI logisticians packaged 5 strips (with 10 tabs each) using rubber bands, and included these with the distributions of safe storage containers. The containers and tablets were then trucked to 18 satellite distribution points throughout the Léogane area. These points were chosen based on location and transportation considerations. CHWs met DSI at these points at a specified time, and DSI paid for CHWs to rent mules which carried 25 systems each back to the home of the CHW.



Distributing containers (Credit: DSI)

The CHWs conducted trainings with families in their community and distributed the systems. DSI was distributing containers and *Aquatabs* to households within 2-3 weeks after the quake.

DSI distributed 67 mg Aquatab tablets, which treat 20 litres of water each at a dosage of 2 mg/L chlorine. This size tablet was selected so that the same safe water containers used in the *Gadyen Dlo* program – the locally produced and modified 5 gallon buckets – could be used. Instructions on the package were in English, French and Spanish, but DSI relied heavily upon explanations by the CHWs to teach families. The *Aquatabs* were chosen so that users only had to add 1 tablet per bucket of water, which simplified use for the householders.



Aquatabs packaging (Credit: aquatabs.com)

Following the initial distribution of containers and 50 tablets, CHWs provided more *Aquatabs* to households as required during regular household visits. The CHWs were paid a monthly salary for their work during the emergency, but did not receive a commission per tablet distributed.

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After May, DSI ended the free distribution of *Aquatabs* and switched to distributing the *Gadyen Dlo* solution to households on a cost-recovery basis. The monthly salaries for CHWs ended at this time; however, CHWs do keep a profit for every chlorine refill sold to a household.

Distribution in Grand Goave

In Grand Goave, in the community of Baudin, *Gadyen Dlo* was distributed once for free during the emergency, to households previously using the solution. These families already had safe storage containers. After receiving one free bottle, distribution resumed at the pre-existing cost-recovery price to households. Free distribution of chlorine products was not continued in this area because although the community was officially in the “affected area”, the damage to homes was assessed to be minimal and the living conditions had not changed dramatically as a result of the quake.

Gadyen Dlo is liquid sodium hypochlorite that is locally manufactured and packaged in plastic bottles. Users add one cap to treat 5 gallons (19 litres) of water in the buckets provided. The instructions for *Gadyen Dlo* were clearly marked on the packaging in the local language (Kreyòl), including illustrations for less literate populations.



Using *Gadyen Dlo* (Credit: unicef.org)

The products were distributed through DSI's network of Community Health Workers (CHWs), who were paid by DSI during the emergency. In the regular (non-emergency) *Gadyen Dlo* program, households initially receive a safe storage container (5 gallon bucket with a lid and spigot), and a 250 mL bottle of *Gadyen Dlo*. The household then purchases chlorine refills from the CHW. The CHWs usually go to centralized distribution centres and buy the chlorine in refillable 1 Gallon containers, which they

then use to refill families' 250 mL bottles during household visits.

Regarding the decision whether to distribute *Gadyen Dlo* solution or *Aquatabs*, DSI National Program Director Michael Ritter says it was affected by their ability to gather information about production capacities and lack of communication infrastructure during the first days of the emergency. “We decided to distribute *Aquatabs* during a time when we were still very unsure about logistics and our capacity to produce hypochlorite. The *Aquatab* purchase was made within 3 days of the quake. [At this time], because of the phone situation, I had still not gotten in touch with the Léogane Program Coordinator to know whether the existing [*Gadyen Dlo*] production unit was still intact (it was). The decision to use *Gadyen Dlo* chlorine in Grand Goave was made after we knew more about production capacity. We knew we would have to make a trip with a large truck to the mountains of Grand Goave regardless of which chlorine source we used, and the quantity of hypochlorite needed to serve 1,000 households was easy enough for us to produce.

In general, I would say a similar lesson was learned about logistics as was learned about adoption of HWTS behaviours: building on existing practices and community practices allows for a cost-effective, and more sustained, effect. For example, using mules as a transportation method kept costs low and allowed us to reach areas which didn't receive assistance from other efforts. Most organizations either chose not to work in the mountains of Léogane (and instead focused on the town and other areas of high population density) or they tried delivering supplies via helicopter, which they weren't able to afford to do on a large-scale or sustained basis” (Ritter, 2012).

Building Capacity

Training and awareness raising were conducted in the communities. Households had to attend a training to receive a safe water system. Following the initial training and distribution, CHWs conducted ongoing household visits to provide instructions, encourage consistent use and distribute more products.

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In the months following the earthquake, DSI recruited and trained 114 new CHWs for working in the Léogane area. The CHWs were trained by DSI staff on participatory hygiene training, product use, chlorine testing, and using monitoring forms. The CHWs continued to work for DSI after the emergency was over, distributing *Gadyen Dlo* to the same households.



CHW training on chlorine testing (Credit: DSI)

Monitoring and Improvement

During the emergency response program, DSI trained CHWs to conduct household visits and how to test for chlorine residual in stored household water. CHWs were instructed to visit households every two weeks. CHWs submitted forms monthly to a head CHW, indicating contact information of any new households they gave products to, as well as chlorine test results.

In addition, field supervisors performed spot checks on CHWs by meeting them at a house, speaking with the family, checking the residual chlorine level in the water, and speaking with the CHW about their own duties and needs. Each CHW received at least 1 spot check during the emergency.

DSI's earthquake response program was also researched by Daniele Lantagne and Thomas Clasen from the London School of Hygiene and Tropical Medicine (commissioned by UNICEF and Oxfam). From mid-February to mid-March 2010, the researchers conducted a survey of random households who received *Aquatabs* or *Gadyen Dlo* from DSI, as well as other HWTS products distributed by other organizations during the emergency. The results were published in March 2011 (see Lantagne and Clasen, 2011).

The two monitoring programs (DSI and Lantagne) found that over 80% of households who received containers as part of the DSI program had chlorine in their water at the time of unannounced visits, which was considered a positive result for correct usage.

DSI's ongoing household visits and monitoring have shown that as of February 2012, households reached during the emergency in 2010 are still receiving regular visits from CHWs, and are still using *Gadyen Dlo*. Spot checks of use and residual chlorine levels in stored household water are conducted by CHWs as part of DSI's ongoing monitoring and improvement program.

Michael Ritter also speaks of lessons DSI learned upon reflection about their implementation approach during the 2010 earthquake emergency. "With respect to choice of product (*Aquatabs* vs. *Gadyen Dlo*): in hindsight, I think using *Aquatabs* was a good decision because it allowed us to focus more on getting product to people as opposed to producing product. However, given what we know now about the state of our production equipment and the fact that we were able to obtain space in the emergency, I do think we could have produced and distributed hypochlorite for the 15,200 families targeted in Léogane. By investing more time in chlorine production, we could have increased brand awareness of *Gadyen Dlo* chlorine [to encourage sustained use after the emergency]" (Ritter, 2012).

Using the lessons learned from their earthquake response, DSI was able to make informed decisions about their response during a different emergency: the Haiti cholera outbreak in October 2010. "We did make a different decision for the cholera emergency (stick with *Gadyen Dlo*). At that point, we had a much more stable base of operations in terms of logistics and chlorine production than we did in the days after the quake" (Ritter, 2012).

Program Financing

Following the earthquake, DSI received funding through partnership with Save the

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Children, private donations, and Lanxess, an American corporation.

DSI estimates the cost of one safe water system to be 15 USD during the emergency, including the container and a 3-month supply of *Aquatabs* (100 tablets) (Lantagne and Clasen, 2011). In a non-emergency program or those integrated with existing initiatives, the cost per system may be lower (Ritter, 2012).

During the emergency, from January to August, in the most affected areas, households did not have to pay anything to receive the products, but did have to attend a training. After this time they had to pay a locally determined price for chlorine refills. Since September 2010, the price for *Gadyen Dlo* in Léogane has been 40 Gourdes (~\$1 USD) per 250 mL for CHWs. Families pay the CHWs 50 Gourdes (~\$1.20 USD) to refill their 250 mL bottle. The CHWs keep the 10 Gourde (\$0.25 USD) difference.

Summary

Lantagne and Clasen (2011) found that DSI's emergency response program was very effective in providing safe drinking water to targeted households after the Haiti earthquake. DSI's program implementation was successful because they:

- Targeted households with contaminated water, such as those using unimproved sources
- Provided an HWTS option that was already familiar to the population and the households were willing to use
- Trained households on how to use the chlorine products and ensured that

people had the necessary supplies, such as safe storage containers

- Conducted ongoing follow-up through household visits, which DSI has also found to be effective in achieving adoption in non-emergency contexts.

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Further Information



Deep Springs International

<http://deepspringsinternational.org/>

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