

KAMBAN & NORMAN

36th WEDC International Conference, Nakuru, Kenya, 2013**DELIVERING WATER, SANITATION AND HYGIENE SERVICES
IN AN UNCERTAIN ENVIRONMENT****Inclusive WASH development:
technology adaptations for persons with disabilities***Nathaniel Kamban & W. Ray Norman, USA***BRIEFING PAPER 1750**

The ability to access and use water sanitation and hygiene (WASH) facilities is a fundamental human right. Increasingly, government and non-governmental organizations (NGOs) are supporting the implementation of WASH projects in the developing world. However, the specific challenges faced by persons with disabilities (PWD) are not widely included in the design process of WASH facilities. Additionally, PWD are often excluded from the implementation and decision-making processes of WASH projects. It is the objective of this briefing paper to describe the findings, recommendations and guidelines for inclusive WASH development gleaned from experience with the Africa WASH & Disabilities Study (AWDS). The AWDS seeks to facilitate access to WASH installations through modifications of existing WASH installations (e.g. hand-pumps, pump superstructures, latrines and laundry aprons) as well as through the development of simple, low-cost assistive WASH technologies (e.g. latrine seats and chairs).

Introduction

West Africa is home to some of the poorest communities in the world. Within these communities, persons with disabilities (PWD) are often the most excluded and vulnerable. Many PWD struggle daily to maintain minimum levels of water and personal hygiene, due in part to the daunting challenges of accessing or using WASH facilities. Due to this problem, World Vision and the Conrad N. Hilton Foundation support the Africa WASH & Disabilities Study (AWDS). The AWDS is commissioned to examine obstacles to inclusive WASH in West Africa Water Initiative (WAWI) communities in Mali, Niger and Ghana. A summary of the AWDS work to date is presented in this briefing paper.

AWDS background

The first phase of the AWDS began in 2007 and concluded in 2011. During this initial phase, the AWDS was primarily based in the country of Mali. The three main objectives and activities of phase one are summarized below (for the full report of phase one see Norman 2010):

- Conduct an assessment of the limitations and opportunities for access to and use of WASH facilities by PWD in target communities.
- Identify and develop modifications for WASH facilities and simple low-cost assistive WASH technologies.
- Provide guidelines and recommendations to World Vision and partner organizations on inclusive WASH development.

Methodology**Data collection - formal survey and focus groups**

Before the technology development process began, an assessment of the particular constraints faced by PWD when accessing and using WASH facilities was needed. Pre-existing data on the extent and types of disabilities in rural areas was generally limited. Therefore, a formal baseline survey was designed to provide

a cross-sectional assessment of the scope of disabilities in relation to WASH use in target communities located in the rural Tominian Circle region of south-central Mali. World Vision-Mali supports six Area Development Programs (ADPs) in this region. The area was selected by World Vision-Mali not only because of its designation as a WAWI target region, its relative ease of access, and its central location in Mali, but also because it was deemed that its ADPs and communities were generally representative of WAWI's other rural target communities — not only in Mali, but in Niger and northern Ghana.

A cluster sampling method was employed with the individual household as the unit of sampling. The sample was determined on the basis of clusters with a probability of being selected proportional to the size of the cluster. Selection of the final 30 clusters (approximately one village each) from a total of 313 villages in the Tominian area was done through unrestricted random sampling.

A two-phase approach was used in the survey process. During the initial phase, heads of households were interviewed regarding the composition of their households and whether PWD lived there. If any PWD were identified, they were further interviewed in the second phase of the survey. The identified PWD were then asked about the nature of their disabilities and the difficulties they face when using WASH facilities.

Results

As part of the household survey, 870 family units representing 7,532 persons were interviewed. From the household survey, 251 persons, or 3.3 per cent of the population, were identified as having a disability in the target area. This number is notably lower than the World Health Organization's estimate of 15.3 per cent (WHO/World Bank 2011), but it is slightly higher than the 2.7 per cent reported by the Malian census bureau (Ballo et al 2001). According to various sources in Mali, the 3.3 per cent is probably lower than the national average due to the study's focus on rural areas. Urban centres tend to have a higher population of PWD due to their migration from rural areas to seek work or charitable support in the cities.

While this number (3.3 per cent) may not seem significant, it should be remembered that for a village of 250 persons (the average population of the surveyed villages), some nine persons are disabled. For a village of 1,000 approximately 33 persons are challenged by disability. From a health standpoint (for both the individual and the community), these numbers are not insignificant.

Development of research priorities

After gathering and analysing the survey and focus group data, research priorities were identified. The three research priority areas are listed below:

1. Access and use of hand-pumps — methods and technologies to facilitate use of hand-pumps.
2. Transport and domestic use of water — involving methods to enhance common forms of water transport and the management and use of water within the household. (The modifications/technologies for this research priority are not included in this briefing. These details can be found in the full report of phase one see Norman 2010).
3. Access and use of latrines — involving methods and low-cost technologies to facilitate the use of latrines (both improved and unimproved).

Involvement of PWD

PWD have been engaged in project work from the very earliest stages. During the data collection phase.

PWD were trained to administer the surveys in their target communities. This act of inclusion exhibited the fact that PWD can serve as active and productive members of society to fellow community members.

In the technology development phase, the concepts for the various modifications/technologies were based upon the needs expressed by PWD. The final models of the various adaptations were developed after numerous field tests with PWD in the target communities. Their valuable feedback ensured that the adaptations appropriately met their needs. PWD met frequently with local artisans during the technology development phase also to ensure that the modifications/technologies were appropriate.

Assistive WASH technology outcomes

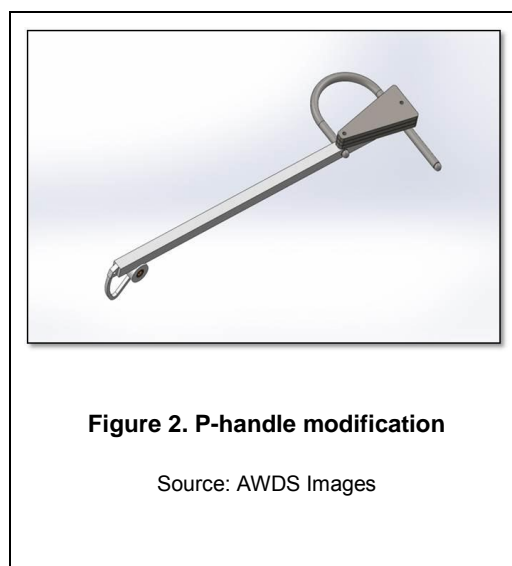
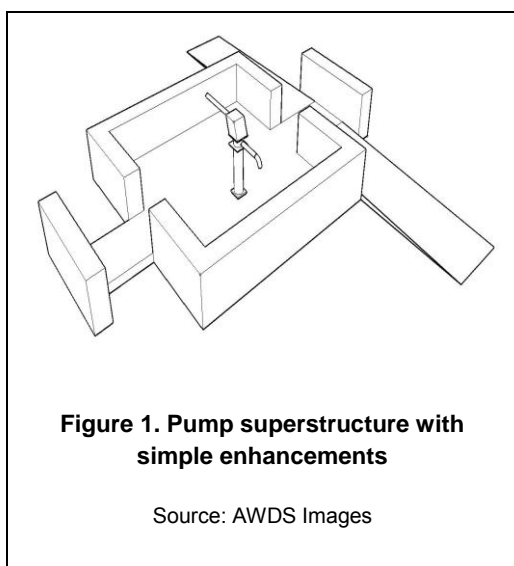
Access and use of handpumps

According to the survey data, only six per cent of all interviewed PWD reported using hand-pumps themselves. Two ubiquitous challenges mentioned were the inaccessibility of the pump superstructure and difficulty manipulating the hand-pump.

Pump superstructures – challenges and recommendations

Once arriving at the superstructure, PWD often find the entrance step up to the pump apron or platform to be a significant impediment, and even more of an obstacle when descending with a full container. Additionally, in the effort to assure adequate drainage of excess water, the slope of concrete aprons around the pumps was observed to be of varying shape and slope (some in excess of 20 per cent) providing a significant challenge to PWD. Lastly, many women and PWD need assistance from others when lifting heavy water containers to their heads – the superstructure lacks any structural support for this task.

In order to improve pump superstructures, the AWDS team redesigned the standard pump superstructure utilized in Mali (see figure one). As part of the modified design, the large step that people are required to negotiate when entering the pump structure was removed. An entrance and exit ramp was also added to increase overall accessibility. The revised pump design also takes into account the slope issue by including a more appropriate slope of five per cent. The modified design also recommends reducing the height of the enclosure walls. By reducing the wall height, the lower walls can serve as a place to rest a jerry can when lifting it to one's head. At present, approximately 100 of these modified pump superstructures have been constructed in Mali with an additional 100 projected to be constructed in 2013. Additionally, World Vision-Mali has trained over 150 local masons to construct these modified superstructures. Based upon data from World Vision-Mali, no additional costs are associated with the modified superstructures.



Manipulating the handpump

Hand-pumps are generally designed to accommodate the size and muscular capacity of healthy, able-bodied adults. As a result, not only PWD, but many children and elderly people may find themselves disadvantaged. In the study's target communities in Mali, the India Mark II pump serves as the standard. This pump has a long slender handle that is over a meter in length. In order to obtain maximum efficiency, it is recommended that the user stand and pump towards the end of the handle. This stance can be awkward and uncomfortable for able-bodied users not to mention PWD. In order to accommodate this need, the AWDS team modified the pump handle design.

A series of pump handle modifications were designed and tested. Currently, the AWDS is testing the P-handle (see figure two). This small, light-weight attachment provides a p-shaped loop that provides a more appropriate gripping device for PWD. The P-handle faces the side in order to be accessed from the pump seat. In addition to pump handle modifications, PWD with lower body limitations requested the addition of a permanent pump seat. Field tests have shown that community members prefer to place the pump seat at a 45 degree angle from the end of the pump handle so as not to hinder users who prefer to pump from a standing position directly behind the handle.

Sanitation and latrine use – challenges and recommendations

Latrine superstructures

Negotiating the latrine entranceway to safely arrive at the latrine hole was mentioned as a problem due to the lack of hand supports along the walls. This can be even more troublesome if the individual must also carry a water container for cleaning. Many PWD mentioned that latrine floors often become muddy (from rainfall or bathing) or soiled (usually from urine as a result of improper latrine use). For those who must crawl on all fours, many stated that traversing floors can be painful, usually due to pebbles or stones in latrines with earthen flooring or unswept cement flooring. Among PWD who have access to a latrine, 85 per cent indicated that they have to touch the latrine floor while accessing the latrine or to stabilize themselves. Many of the interviewees suggested that technologies were needed to help avoid the need to sit directly on the latrine hole such as handles or support devices to assist in squatting.

Based upon the responses of the community members, the AWDS team modified the original latrine design by adding support devices to the walls of the latrines. This assists latrine users not only enter the latrine, but also lower and raise themselves to and from a squatting position. A simple and cost-effective option for installing handholds in latrine walls is the simple practice of turning bricks sideways during wall construction at points where holds are needed (see photograph one).

Latrine seats and chairs

Perhaps the most challenging aspect of latrine use by PWD in the target communities is that of squatting and cleaning. Persons with lower-body limitations often have difficulty in one or more of the following actions: a) lowering themselves to a squatting position; b) maintaining a squatting position without the support of their hands; c) cleaning themselves after defecation; and d) raising themselves to a standing position when finished. For these reasons, the AWDS team examined a range of latrine seats and chairs.

In the effort to provide a low-cost solution for PWD who lack sufficient lower-body strength to squat, the fabrication of fired-clay seats was explored. These seats are inexpensive 400-1,500 cfa (.80¢ - \$3.00 USD). With the assistance of the clay seat, PWD no longer needed to sit directly on the latrine hole. While personal cleaning is made somewhat easier and more hygienic than when seated directly on the hole, some individuals still struggled with this as it is still difficult to reach one's buttocks with a cupped handful of water.

In order to provide additional options and greater assistance with cleaning, metal and wooden chairs were developed and tested. Unlike the clay seats, the metal and wooden chairs provide numerous openings thus providing the user with more space for cleaning. The metal and wooden latrine chairs utilize the same design (see photograph two). This design is universal in nature because users can clean themselves either from the front or behind depending on their preferences (this was not taken into account in earlier prototypes thus resulting in dissatisfaction among beneficiaries). The primary differences between the two models are in terms of price and durability. The metal chair can be fabricated for approximately 8,000-10,000 cfa (\$16.00-\$18.00 USD), but is more durable than the wooden model. The wooden model, however, can be produced for a cost of approximately 2,500 cfa (\$5.00 USD), but is less durable.



Photograph 1. Latrine handhold supports

Source: AWDS Images



Photograph 2. Wooden latrine chair

Source: AWDS Images

Latrine usage for the visually impaired

For the visually impaired, traversing the courtyard and the latrine structure can be difficult, much as it is for persons with other forms of disability. Most challenging for the visually impaired is locating the latrine hole and positioning themselves accurately over the latrine hole in a squatting position. In both Niger and Mali, it was noted that most persons with significant visual impairments simply use their unprotected hands.

A simple, low-cost method for assisting the visually impaired was tested. This method involves the use of string weighted with stones. A string is suspended across the walls adjacent to the sanplat using stones attached to both ends (see figure three). A second string is attached at the center of the cross string, directly above the latrine hole. This vertical string is then weighted at its low end with another stone and is lowered into the latrine hole some 40-50 cm below the surface of the sanplat. This vertical string is permanently fixed in this position and should not be removed (as the lower end will be soiled) except for repair.

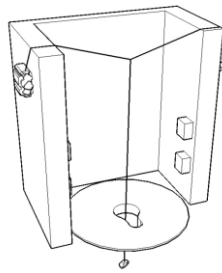


Figure 3. Latrine modification for the visually impaired

Source: AWDS Images

The visually impaired person can locate this string and the general location of the latrine hole with an outstretched hand. When descending to a squatting position he can then keep one hand on the string for accurate body positioning over the hole. As he squats, the string under tension will give way to the side while he remains in the squatting position. This system was tested for twelve months and was found to be easily mastered by adults with visual impairments.

Next steps

In October 2011, the second phase of the AWDS commenced. As part of the second phase, study activities are expanding to the countries of Niger and Ghana. The main objectives and activities of phase two are summarized below:

- Conduct assistive technology transfer assessments to determine the transferability of the WASH modifications/technologies to Niger and Ghana.
- Conduct assistive technology development initiatives with local artisans in each country.
- Complete technology dissemination activities through the development of marketing and business plans.
- Continue to provide guidelines and recommendations to World Vision and partner organizations on inclusive WASH development.

Pump superstructure

In each of the three target countries, different pump superstructure designs are utilized by World Vision and supported by the various government agencies. Therefore, it is the aim of the AWDS team to determine how to transfer the Malian pump adaptations to the standard superstructure designs in the additional target countries.

P-Handle pump testing

Before the P-handle can be recommended to partner organizations, additional tests of the handle are needed. Specifically, testing of the handle needs to be completed in varying cultural and ethnic contexts and geographic areas.

Technology dissemination

During phase two, the AWDS team has begun to develop a dissemination plan for the low-cost assistive WASH technologies (e.g. latrine seats and chairs). The exact manner in which this dissemination process is to be completed needs further reflection.

Conclusion

WASH programming is an integral part of the agenda of many governments and NGOs in the developing world. However, as in the case of Mali described above, many well-intentioned organizations have unknowingly overlooked the needs of up to 15 per cent of their target communities (WHO/World Bank 2011). When discussing issues of inclusivity in WASH, it may be tempting for implementing organizations to assume that a large budget increase is needed. However, it is the experience of the AWDS, that simple, low-cost adaptations can greatly increase the accessibility of WASH facilities for all users.

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References

- Ballo, Mamadou B., Seydou M. Traoré, Isaka Niambélé, Souleymane Ba, Mohamed Ayad, and Salif Ndiaye (2001) Demographic and Health Survey Mali. Ministry of Health.
<http://www.measuredhs.com/publications/publication-FR134-DHS-Final-Reports.cfm>
- Norman, Ray W. (2010) Water, Sanitation and Disability in Rural West Africa. Messiah College: Mechanicsburg, PA, USA.
http://www.messiah.edu/collaboratory/media_press/documents/hiltonreport_reducedsize.pdf
- World Bank and the World Health Organization (2011) World Report on Disability 2011.
http://whqlibdoc.who.int/publications/2011/9789240685215_eng.pdf

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