Leonard Cheshire Disability and Inclusive Development Centre

Water and Sanitation Issues for Persons with Disabilities in Low and Middle Income Countries

Literature Review and Discussion of Implications for Global Health and International Development Efforts

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Abstract

Unrestricted access to clean drinking water and basic sanitation is an important cornerstone for ensuring good health and well-being to millions of men, women and children in low and middle income countries. The critical importance of such access is highlighted in Millennium Development Goal 7 which calls for the reduction by half of the proportion of people without access to drinking water and sanitation. Unfortunately, little attention has been paid to the needs of access to safe drinking water and basic sanitation for the 690 million people living with a disability worldwide, despite the right to equal access to all international development initiatives guaranteed in the new United Nations Convention on the Rights of Persons with Disabilities. (UN, 2006) In this paper, we review what is currently known about access to water and sanitation for persons with disabilities in low and middle income countries from the perspective of both international development and global health, and identify current gaps in research, practice and policy that are of pressing concerns if the water and sanitation needs of this large – and largely overlooked – population are to be addressed.

Key Words: Persons with disability, water, sanitation, public health, international development.

Introduction

In the field of public health, the global burden of disease resulting from poor access to water and sanitation facilities is often measured in DALYS (disability-adjusted life years). However, the short and long-term implications of lack of access to clean water and basic sanitation faced by millions of persons with physical, intellectual, sensory (blindness, deafness) or mental health impairments is not routinely discussed or evaluated. Nor are the social, economic or health implications which this lack of access might have on the health and well being of these individuals, their families and their communities.

Millennium Development Goal 7 Target C is to halve from 1990 the proportion of the population without access to water and sanitation by 2015 (UN, 2000). According to the UN, an estimated 690 million individuals, roughly 10% of the world's population are persons with disabilities. (UN Enable, http://www.un.org/disabilities) Thus Goal 7 Target C will not be achieved unless persons with disabilities are routinely included in water and sanitation programmes (Groce and Trani, 2009).

This paper reviews the existing knowledge on water and sanitation as it relates to persons with disabilities. Barriers faced by persons with disabilities in low and middle countries when accessing safe water and basic sanitation facilities will be discussed, research which has already been carried out on this subject, largely from the engineering field will be reviewed, and the potential health and development implications of lack of access to adequate water and sanitation facilities will be examined. The paper will then go on to identify where gaps in knowledge currently exist, and to make suggestions for future research in this field. Thus this paper is intended to provide an overview and an introduction to water and sanitation from the perspective of global disability research and advocacy for international development and public health professionals as well as for those working in global disability policy and practice.

Barriers to Access

Issues preventing disabled people from accessing water and sanitation in developing countries vary greatly depending on cultural and geographical context, as well as by the type of impairment a disabled person may have. Thus a person with a physical impairment may face significantly more difficulties in using a hand pump or an outdoor latrine, a person with an intellectual disability or a sensory impairment may have no physical difficulty in walking to a community latrine, but be teased or abused and thus find such a facility inaccessible for social and safety reasons.

Some of the barriers faced by people with disabilities have been outlined in studies undertaken in Ethiopia, Mali and Bangladesh by researchers at The Water Engineering and Development Centre (WEDC) at Loughborough University in collaboration with local NGOs, DPOs (disabled peoples organizations), and relevant government departments. These barriers can broadly be separated into *technical* and *social* barriers (Pradhan, 2008).

Technical Barriers

Technical barriers include the structural difficulties faced by persons with disabilities in accessing water and sanitation facilities. WaterAid studies have found that in particular, many people with physical impairments in the communities studied are unable to collect water for themselves, either because they cannot carry it the distance required, or because of inaccessible water points or wells. For example, well walls can be too high, or there is nowhere to rest the water container whilst filling it. (Pradhan, 2008, WaterAid, 2006, Tesfu, 2006, Kendra, 2008)

It was further found that even if persons with physical disabilities are able to carry water, they may not be able to carry the amount they need (Kendra, 2008) and

reports from the field collected by the Leonard Cheshire Disability and Inclusive Development Centre indicate that even in the hottest climates, individuals with disabilities report restricting the amount of water they use or consume because of this inability to transport needed amounts back to their household. Persons with physical disabilities also report that carrying water can be exceptionally time consuming - either for themselves or for the person collecting water on their behalf.

As collection of water is often an activity undertaken by one or two members of the family on behalf of the others, some studies have found that people with disabilities reported more difficulties accessing sanitation facilities than collecting water. (Kendra, 2008) Toilets/latrines are often inaccessible to people with physical impairments – doors are not wide enough to fit wheelchairs in, or latrines are not large enough to enable persons who use wheelchairs to enter the facility and close the door behind them to ensure privacy. Where there are steps, where latrines are too small to enable people to enter in their wheelchairs or where floors are too slippery to be safe for people who use crutches or those who have difficulty walking or balancing, people with physical impairments in countries around the world report that they end up crawling on the (often dirty) floor to reach the latrine.

Other frequently mentioned structural barriers were lack of support bars in latrines for people who have difficulties holding themselves in a squatting position, and this is particularly a problem for women. (Pradhan, 2008) Additionally, the risk of accidents due to slippery/uneven paths; unsafe wells; and necessity of open defecation at night-time are also regularly cited as concerns. (Pradhan, 2008, Kendra, 2008, Jones, 2008, Tesfu, 2006, WaterAid, 2006, Jones, 2005a). The difficulty in accessing enough water to wash themselves after every trip to the toilet is also reported regularly by persons with disabilities and this is likely to put them at increased risk of disease (WaterAid, 2006, Tesfu, 2006, Pradhan, 2008).

Lack of knowledge amongst water and sanitation providers, and persons with disabilities themselves, about appropriate infrastructure designs and available technology to make adaptations for persons with disabilities is another significant technical barrier (Pradhan, 2008, Jones, 2003). Notably many of the technical barriers faced by persons with disabilities are also faced by pregnant women, the elderly, children and people who are overweight, meaning that accessible facilities could benefit many members of society (Pradhan, 2008, Kendra, 2008, Flowers, 2009)

Social Barriers

Social barriers for persons with disabilities in accessing water and sanitation facilities are likely to vary in different contexts, and are therefore wide-ranging. Some studies report that people with disabilities faced stigma and discrimination from others in the community when using public facilities over fears that the water sources would be 'contaminated' (Pradhan, 2008) or that they would make the latrines dirty (Rukunga, Pradhan, 2008, Kendra, 2008, Jones et al., 2003).

People with certain types of disabilities report that it takes them a long time to use the facilities due to access issues – a stigmatising experience when using communal latrines (Kendra, 2008). Others who were unable to enter latrines (or who did not use them due to discrimination from their communities) mentioned the stigma associated with open defecation, resulting in people (particularly women) only going in the dark, and the resulting danger of accidents and adverse health implications (Kendra, 2008, Pradhan, 2008).

Many of the studies currently available on access to water and sanitation for persons with disabilities mention the low self-esteem and lack of dignity experienced by persons with disabilities who are dependent on family members to assist them in using inaccessible water, and particularly sanitation facilities (Hannan, 2005, Tesfu, 2006, Pradhan, 2008). The issue of time allocation within

families also frequently arises when persons with disabilities who require assistance because of inaccessible water and sanitation facilities and their family members are interviewed. This may compound negative attitudes already existing in families who perceive a disabled family member as a social or financial burden (Tesfu, 2006, Pradhan, 2008). Where accessible latrines have been provided, anecdotal evidence indicates that this can make a significant difference to a disabled person's self-esteem, to the attitudes towards them within their household and to their status within their community. It also appears to increase the time available for themselves and/or their care givers to engage in profitable, educational or social activities rather than expending time on mundane chores (Kendra, 2008, Pradhan, 2008, Jones, 2005c, Hannan, 2005).

Although most of the studies on persons with disabilities and water and sanitation focus on the individual's home and community, a few also discuss the implications of lack of access to water and sanitation facilities in school and in the workplace (Musenyente, 2005, Menya, 2005, Pradhan, 2008). Anecdotal evidence suggests that children with disabilities are often prevented from attending schools due to a lack of accessible toilets (Menya, 2005), and that persons with disabilities are prevented from accessing employment due to a lack of accessible toilets in the work place (Pradhan, 2008). Fieldwork in Uganda found that increasing enrolment of disabled children in schools through inclusive education programs and legislation, were undercut by lack of accessible toilets, with a particularly high dropout rate reported among physically disabled girls when they reached puberty and were unable to access toilets at school modestly. (Kett and Groce, 2009) In an era when UNESCO still reports that more than 90% of all disabled children do not attend school and illiteracy rates among disabled women may be as high as 99%,(UNESCO 2008, Groce and Bakshi 2010) it seems particularly unfortunate that bright young physically disabled girls are dropping out of school because they cannot get into the school bathroom and close the door behind them for privacy.

Lack of accessible water and sanitation facilities can also be anticipated to increase the financial burden on the family, particularly if another member of the household acts as the carer and remains at home rather than participating in the work force. Some studies suggests the burden of this lack of access is higher for women, as they are often responsible for household chores (collecting water) and caring for other family members when required (Jones, 2005c, Pradhan, 2008). These financial difficulties may also mean that families with a disabled member where both the disabled individual and the carer stay out of the workforce may be less likely to be able to afford to make structural adjustments to their own water and sanitation facilities to increase access of the person with disability, and in such cases the cycle will continue. Similarly, if children with disabilities are not able to attend school, they will remain uneducated and may experience further barriers to influencing decisions made within communities (and within their families) about water and sanitation facilities (Jones, 2005c, Pradhan, 2008).

Technical Knowledge and Experience

While there is a limited amount of work on the adaptation of water and sanitation systems for persons with disabilities, some excellent resources are now available. Most notable is the work of Jones and Reed at the Water Engineering and Development Centre (WEDC) at Loughborough University in the UK. Jones and Reed's DFID funded research on 'Water Supply and Sanitation Access and Use by Disabled People' from 2002 and 2005 produced significant contributions to the field. From an engineering perspective, they have looked extensively at structural solutions to improve access of persons with disabilities to water and sanitation facilities.

Jones and Reed's research began with literature reviews, a questionnaire and an e-conference, held in 2002 on the theme of water and sanitation and disability.

They followed this initial work with research with disabled people in Bangladesh, Uganda, Cambodia and Sri Lanka to identify needs and develop solutions using local, inexpensive materials. This research has been carried out in association with WaterAid and several other organisations, in order to encourage water and sanitation service providers to include persons with disabilities in their programmes.

Aside from structural solutions developed by WEDC researchers, key findings from their research were as follows:

1) There is a lack of relevant information and documented examples of good practice in the field;

2) Barriers to access arise from obstacles in the built environment, social barriers and institutional factors as well as individual's limitations, and this range of barriers needs to be addressed holistically;

3) It is more cost-effective to design accessible facilities from the outset rather than making changes later on;

4) Although many governments and international agencies have policies/ legislation about the inclusion of persons with disabilities, these are rarely carried out in practice, perhaps due to a lack of information and examples of good practice;

5) It is essential to include persons with disabilities in decision-making processes about water and sanitation programmes in order to build on existing practices, and to ensure the resulting solutions will be effective. The training of service providers is required to ensure they include persons with disabilities in consultations and do not see disability as a separate "specialist" issue; and

6) Women with disabilities often face double or triple discrimination, and their needs are often completely overlooked (Jones et al., 2003).

Jones and Jansz (2008) have discussed the merits and risks of two different approaches to improving accessibility: 1) Starting with a group of people with a specific impairment, identifying problems and needs, and developing solutions to address these individual needs (e.g. WaterAid Ethiopia) ; 2) Starting with a community, identify problems with accessing existing services for whoever uses them, and developing solutions to eliminate common obstacles to accessibility (e.g. WaterAid Bangladesh) (Jones, 2008). The first approach focuses on solving individual problems effectively, but limits applicability to other users and risks segregating users – it largely involves developing individual accessibility aids. The second approach is more holistic and involves developing standardised designs and changing the infrastructure which will increase accessibility for more people but is unlikely to meet the needs of all users. The second approach fits with the idea of universal design, which aims to design environments which can be used by everyone, without requiring specific adaptations, (Universal Design Network, 2010), as well as with calls for universal access to sustainable water and sanitation supplies. (Montgomery et al. 2009)

Jones et al highlight that both individual assistive devices and accessible facilities are important in ensuring access to water and sanitation facilities for persons with disabilities (Jones et al., 2003). One of the main outputs of WEDC's research is an on-line resource book designed for use by water and sanitation providers and planners, as well as by disabled people's organisations and organisations working with people with disabilities to assist them in thinking about these issues and in designing solutions that are inexpensive, use local materials and result in local ownership and local maintenance (Jones and Reed, 2005b). The Hesperian book 'Sanitation and Cleanliness for a Healthy Environment', designed to be

used by communities, also includes a brief section on access to sanitation facilities for persons with disabilities (Conant, 2005).

Health Implications of Lack of Access to Water and Sanitation

Significantly, the health implications of lack of access to water and sanitation have not been documented specifically for persons with disabilities. In the course of undertaking this desk study, the public health and medical literature was systematically reviewed through Medline, Web of Science and Global Health search engines, with particular attention to any papers or studies that might link disability to issues of water related morbidity or mortality, both in terms of epidemiological evidence as well as disease-specific evidence.

Particularly absent was any information on exposure to ill health or death as a result of lack of water and sanitation facilities for persons with pre-existing disabling conditions. This lack of focus on the health of persons already living with a disability is common across a number of public health arenas. Very limited research exists for example, on basic paediatric care for disabled children in the Developing world, on HIV/AIDS among persons with disabilities or on health care for disabled women. Thus although the lack of information on the links between persons with disabilities and water related ill health or benefits received through inclusion in improved access to clean water and basic sanitation, this lack of attention did not come as a complete surprise.

However, some estimates exist which give an indication of the burden of disease attributable to water and sanitation worldwide. We summarize these below and then discuss the implications that these may have for persons with disabilities.

Prüss et al estimated that poor access to water, sanitation and hygiene is responsible for 4% of global deaths and 10% of the total disease burden (in DALYs) worldwide. (Pruss et al., 2008). The World Health Organisation has estimated that 1.8 million people die every year from diarrhoeal diseases (90% of

whom are children under five in developing countries), and 88% of diarrhoeal disease can be attributed to an unsafe water supply and/or inadequate sanitation and hygiene (WHO, 2004). It has been estimated that improved water quality reduces diarrhoea morbidity; point-of-use household water treatment and improved sanitation led to reductions in diarrhoeal disease of 35% and 32%, respectively (Fewtrell, L., et al, 2005). Health gains from improvements in water, sanitation, and hygiene are not limited to reductions in diarrhoeal diseases. An estimated 2 billion nematode infections could be averted along with 200 million fewer individuals suffering from shistosomiasis and 5 million fewer cases of visual impairment due to trachoma by providing access to clean and safe water and sanitation supplies (Pruss, et al., 2008). Trachoma, the world's leading cause of preventable blindness, is particularly relevant to this discussion because it represents an example of how lack of access to sanitation and hygiene actually induces a disability (irreversible blindness), further compounding the already difficult situation faced by individuals with pre-existing disabilities, while adding to the total numbers of individuals living with a disability in those communities at risk of the disease. Field research in Tanzania demonstrated that use of a simple pit latrine reduces risk of trachoma by half (Montgomery, et al, 2009).

When discussing direct effects of water supply on health, Cairncross stresses that quantity of water available is far more important than quality of water, as "practically all potentially waterborne infections that are transmitted by the feco-oral route can potentially be transmitted by other means (contamination of fingers, food...) all of which are water-washed routes" (Cairncross, 2006).

It can be assumed that persons with disabilities are at least at equal risk of exposure to any and all of these infectious diseases. Indeed, although no research on this currently exists, it can be speculated that individuals with mobility impairments who must crawl or remain seated rather than standing or walking, may be at increased risk of exposure to a number of such infectious diseases. Furthermore, while we can assume that persons with disabilities are at

equal or increased risk of exposure to such diseases, there is a growing body of data that clearly show that while persons with disabilities have equal risk or increased risk of exposure, they are far less likely than their non-disabled peers to have timely access to medical care – or any access to medical care - should they fall ill. (Groce, 2006)

This is important as it suggests that a lack of access for persons with disabilities to adequate sanitation facilities and sufficient water to wash properly could have a significant impact on the health of these individuals as well as the health of their households and communities. Examples of this are replete in the water and sanitation literature. For example, Cairncross provides evidence that improvements in excreta disposal in a community help prevent diarrhoeal disease, trachoma and intestinal worms, and emphasises the importance of everyone in a community using suitable sanitation facilities all of the time, in order to prevent the spread of disease (Cairncross, 2006). It is estimated that open defecation in rural areas affects almost one third of the world's population (Bongartz, 2009). Communities which are trying to achieve 'open-defecation free' status will not succeed if persons with disabilities in those communities are still forced to defecate outside due to lack of access to a latrine (Bongartz, 2009, Pradhan, 2008). It is therefore in the health interests of the whole community that everyone has access to appropriate sanitation facilities (Jones, 2005c, Pradhan, 2008).

The health implications of limited access to water and sanitation facilities are broader than those of infectious disease alone. In cultural settings where women are only able to defecate and urinate in the dark, Cairncross suggests that an increased prevalence of urinary tract infections is likely (Cairncross, 2006) – an additional health risk which persons with disabilities who are unable to use latrines during daylight hours (due to accessibility issues or stigma) may also be exposed to. Anecdotal reports from a number of countries collected by researchers at the Leonard Cheshire Disability and Inclusive Development

Centre, University College London suggest that in locations where persons with disabilities need assistance to use the toilet, individuals may significantly restrict their intake of both water and food throughout the day, waiting until evening to ensure that a member of the household will be nearby to assist them with toileting activities. In hot climates, restriction of water during the day may have significant health implications. In many countries, restricting food to one meal a day may lead to serious under-nutrition or malnutrition in individuals who may already be nutritionally compromised.

In societies where persons with disabilities face stigma and discrimination, use of difficult to access public water sources and latrines place many persons with disabilities at risk, particularly if they need to use such facilities after dark. Individuals with physical, intellectual, mental health and sensory (blindness/ deafness) disabilities routinely report incidences of physical, verbal and sexual abuse when using public water pumps and latrines. (Groce, 2006)

Other Implications of Lack of Access to Water and Sanitation

Lack of access to water and sanitation has significant social as well as significant health implications. Health is obviously an important issue related to limited access to water and sanitation, but it is often not ranked highly by beneficiaries of water and sanitation programmes themselves. A study by Jenkins et al in rural Benin (Cairncross, 2006, Jenkins, 1999) showed that when attributing levels of importance to benefits of owning a latrine, health ranked low on the list of perceived benefits. The social benefits of owning a latrine were generally regarded as being more important – for men, latrine ownership was associated with enhanced social status, while for women, security and convenience were more significant (Cairncross, 2006).

Persons with disabilities and their families are disproportionately poor – while the UN estimates that one in every 10 people lives with a disability, a World Bank

paper estimates that one in every five persons living in extreme poverty is a person with a disability (Elwan, 1999). More recent publications from the World Bank indicate that the interplay between disability, poverty and health may be more nuanced, but is no less an area of significant concern. (Mont and Loeb, 2008)

The link between poverty, disability and access to water and sanitation resources, particularly in communities with improving economic resources, needs to be considered and addressed. Thus latrine ownership – or lack thereof - may have an even greater impact on the social status of a person with a disability, particularly if it means they are better able to maintain their dignity and engage with the rest of the community.

The economic justification for ensuring access to water and sanitation facilities for persons with disabilities ahs yet to be adequately addressed in the literature. But the link is a clear one. The lowest quintile is 16 times more likely than the wealthiest to practice open defecation. Thus while the majority of the poorest practice open defecation (63%), the wealthiest do not (4%). (WHO/UNICEF 2010). Those with disabilities and their families fall disproportionately into the poorest quintile and thus may be considered at significantly increased risk. – And by extension, in increased need of targeted sanitation interventions.

As previously noted, Cairncross and colleagues have already established a solid link between improved access to water and sanitation facilities and the saving of time and therefore money, as time spent transporting/queuing for water can instead be spent earning money (Cairncross, 2006). Hutton et al (2007) report that in Sub-Saharan Africa there is at least a US $5 benefit for every US $1 investment in water and sanitation. This argument is particularly salient for persons with disabilities and their households – if the disabled person can access water and sanitation facilities without assistance from a family member, then the family member who would have needed to assist them can use their time more

productively. Improved access to water and sanitation may likewise enable the person with a disability to use his or her time more productively both at home and in the workplace. (Hannan, 2005, Jones, 2005c, Kendra, 2008, Pradhan, 2008)

Current Gaps in Knowledge

Data on disability prevalence, on disability within the broader realm of international health and development efforts and specifically, within the realm of water and sanitation, are currently exceptionally limited worldwide. Even in developed countries, the vast majority of data available is collected specifically to address issues related to social benefit systems (Jones, 2008). Where no social benefit systems exist, data on disability has only recently begun to be collected – much of it in relation to the new efforts called for by the UN Convention on the Rights of Persons with Disabilities (United Nations DESA, 2008) and the work of the UN's Washington Group on Disability Statistics. (Washington Group 2010)

Data available on the access of persons with disabilities to water and sanitation are largely anecdotal or based on small scale studies that are largely qualitative in nature. Examples of such studies, usually collected by water and sanitation programmes to generate technical solutions to ensure inclusion of persons with disabilities in larger community projects include the following: Jones, 2005c, Jones et al., 2003, WaterAid, 2006, Tesfu, 2006, Russell, 2008, Kendra, 2008. The technical knowledge which has been generated by these studies, particularly by the WEDC research, is extremely useful, but these efforts need to be implemented – and then evaluated - on a wider scale by water and sanitation service experts to allow for a more nuanced understanding and broader implementation of these efforts.

Additionally, existing studies document interesting examples of coping strategies used by persons with disabilities in accessing water and sanitation. For example, the use of ropes or fences to help guide persons with visual impairments to

household wells or latrines, the use of easily made support bars, hand rails or other low tech adaptations, the use of adaptive clothing – replacing buttons with Velcro – and so forth. This initial work underscores the need to collect more data and examples of good practice to better understand how persons with disabilities adapt to and address such difficulties without external interventions, how and to what extent persons with disabilities actually do rely on other household members for assistance, and how this impacts upon personal relationships within families and households, as well as the economic and social implications that this represents. While such support mechanisms may affect all members of the household, in the experience of the authors of this paper, the responsibilities for assisting and supporting disabled members of households falls disproportionately on women, especially in the poorest of households. Thus equitable and accessible access to water and sanitation for persons with disabilities is also a gender issue.

The health implications of restricted access to clean water and basic sanitation, as noted earlier, are anticipated to be significant in terms of infectious and water borne diseases, psychological issues and safety concerns for both men and women, but almost no research currently exists on this subject. Furthermore, while some of the potential implications can be deduced from more general studies, it is likely that some health outcomes could be different for persons with different types of disabilities, and this area has not yet been explored. Also, should a person with disabilities fall ill due to restricted access to clean water and basic sanitation, it can be anticipated that in many households – especially in the poorest households – they will be less likely to have access to timely medical treatment. Thus it is anticipated here that there may be significant differences in both morbidity and mortality for persons with disabilities with respect to both water and sanitation related diseases. The implications of exposure to these diseases for their households is also little researched. A systematic review of the current public health literature reveals a significant gap in the literature on this

– and we call upon public health and sanitation experts to address this gap in the data at levels of both individual and public health.

In addition to social, health and economic issues, additional research and innovation is needed to identify technically viable adaptations for persons with disabilities – especially adaptations that can be low cost, locally implemented and sustainable over time. There is also a need to investigate intermediate measures (e.g. the use of pots of water for washing; adaptations for toileting) used by households when they cannot afford to or have been unable to implement structural changes. Identification, description and broader dissemination of such adaptations is greatly needed.

Case studies illustrating how inclusive water and sanitation programmes have made a difference for certain individuals represents important contributions to the literature (see for example: Kendra, 2008, Pradhan, 2008, Jones, 2005c, Hannan, 2005). The next step from an international development and public health perspective is for implementation and evaluation on a larger scale of such interventions with rigorous and longitudinal assessments in order to better identify what works, why it works and what the actual benefits are to persons with disabilities and their family.

Next Steps

Research on the ramifications of access and lack of access to safe water and basic sanitation for persons with disabilities is needed at all levels. In order to increase the data available, questions on persons with disabilities should be included in general studies on access to water, sanitation and hygiene practices all over the world. It would be equally beneficial to include questions about water, sanitation and hygiene practices in disability research projects. This two way approach to disability research has been labelled by DFID as a ‘twin track’

approach (DFID: 2000) – and it is particularly relevant in the field of water and sanitation.

Among the specific recommendations based on this literature search and analysis, we offer the following:

- Rigorous monitoring and evaluation of programmes which have included persons with disabilities in water and sanitation service provision would be extremely useful for building on existing knowledge about what works on the ground, particularly if these interventions could be followed up longitudinally.

- Particular attention should be given to studies undertaken in order to better understand the health impacts of lack of access to adequate water and sanitation facilities for persons with disabilities. There is an opportunity for this to be analysed through an intervention study, to see what difference improved access makes to the health outcomes of persons with disabilities and their families.

- Increasing the evidence base about the experiences of persons with disabilities in accessing water and sanitation facilities, as well as providing concrete examples of what works to improve access, would be instrumental in changing the policies of water and sanitation service delivery organisations to include persons with disabilities in their work.

- Cost-benefit analysis and other economic studies of benefits to persons with disabilities and to members of their households when improved water and sanitation facilities are made available – or the costs to households that lack such facilities – would help justify the

costs that may be attendant in making current and/or future resources and facilities accessible to persons with disabilities.

- Persons with disability must be included in the WHO/UNICEF Joint Monitoring Program (the landmark effort tracking global access to water and sanitation) as well as DHS and DMSS studies.

In summary, what is needed at this point is to develop a body of evidence that can be used to lobby at both small and large scale development levels to consider persons with disabilities when planning the adaptation of existing or construction of new buildings/water and sanitation projects, both in households and in the community. Attention to accessibility of facilities in schools and other public buildings, to help facilitate greater inclusion of persons with disabilities in education and employment, are particularly important and consistently overlooked.

Conclusion

As 10% of the world's population have a disability, persons with disabilities need to be included in all water and sanitation interventions, in order to meet Millennium Development Goal 7 for water and sanitation, as well as to ensure compliance with the new United Nations Convention on the Rights of Persons with Disabilities. Elimination of water borne/water washed diseases within communities is likely to be impossible unless persons with disabilities have access to safe and adequate water and sanitation facilities.

Such accessibility must be a component of every water and sanitation effort. Some technical solutions already exist, but additional adaptations and innovations are much needed and more evidence is essential to understand the potential impacts of improved access to water and sanitation may have for persons with disabilities and their families and communities. All of these issues

must be addressed in a timely fashion because the inclusion of persons with disabilities is both a right and an act of enlightened self-interest on the part of civil society, health organizations, schools and Governments.

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