



# Socio-cultural acceptance of appropriate technology: Identifying and prioritizing barriers for widespread use of the urine diversion toilets in rural Muslim communities of Bangladesh

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## ABSTRACT

The Urine Diversion Dehydration Toilet (UDDT) is an important technology which could raise the standard of living for the poorest areas in low-income countries. It is a resource reuse oriented sanitation technology and onsite treatment system for human wastes. It can be one option to solve global sanitation problems by breaking socio-cultural taboos in water, sanitation and hygiene in low income countries. In this study, both qualitative and quantitative data were collected to assess the socio-cultural acceptance and replication of UDDTs in rural Muslim communities in Bangladesh. The study results showed that UDDTs have been generally accepted by almost all users and to some extent by non-users. There were some social and cultural barriers to accepting UDDTs in the study area. Major drivers, which need to be further explored and researched, were found to heavily influence the acceptance and replication of UDDTs. Importantly it was found that the biggest challenge to the acceptance of this technology was not the replication of UDDTs or socio-cultural barriers. Instead, the biggest challenges were high construction cost, dependence on subsidies from donors and a lack of financial contribution from the government. It was found that even though socio-cultural barriers are important, identifying the proper drivers, alternative financial mechanisms (such as involvement of micro-finance organizations), the involvement of community based organizations, and the active participation of local governments were the top priorities. Identifying these factors and prioritizing them is essential for deploying UDDTs and similar technologies throughout other parts of the world. This study provides insight into technologies that are critical for development in low income countries as well as the characterization of socio-cultural factors that are involved at this intersection of technology in society.

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## 1. Introduction

The world is not positioned to meet the sanitation target of Millennium Development Goals (MDG) [21] which is one of the key issues of global concern at present. The global

sanitation situation needs to be improved not only to reduce waterborne diseases but also to improve overall environmental conditions. Improved sanitation, which is defined as one that hygienically separates human excreta from human contact, is the key for securing public health and having access to safe drinking water [4]. Even though simple pit latrines are considered improved sanitation facilities, they have a great risk to pollute surface water in the event of flooding, or ground water when seepage and percolation occur depending on soil types [6]. It is estimated that 1.1 billion people still practice open defecation in the world [20] and are highly vulnerable to health risks.

Most of the low income countries from Sub-Saharan Africa and South-East Asia will not be able to achieve the sanitation target in the MDG target of halving the number of people without access to adequate sanitation by 2015 [23]. To achieve the MDG target of sanitation, innovative, comprehensive and economically viable solutions are needed [22]. Urine Diversion Dehydration Toilets (UDDTs) can be considered one of the sustainable sanitation technologies where there are provisions to collect feces, urine and greywater separately and avoid mixing [1,22]. UDDTs might be one of the alternatives to protect both human health and environment [19]. Important considerations for the installation of UDDTs include economic feasibility, acceptability by users and technological and institutional appropriateness [8,16,18]. Socio-cultural acceptance and replication of UDDTs are great challenges for rural, peri-urban and urban areas of low income countries [3]. Although negative attitudes and low acceptance of UDDTs have been encountered (see for example, [11,13]) UDDTs break socio-cultural taboos and solve environmental and sanitary problems systematically. They help to recover resources by bridging sanitation and agriculture [10,19,25].

Bangladesh, a Muslim dominated country, is a low income country in Asia. Fifty percent of the population live below the international poverty line and on average 53% of the population is using improved sanitation facilities [26]. The expensive conventional sewage treatment system is considered as an anti-poor technology [15], and therefore not affordable for greater poor communities in Bangladesh. UDDT is not an old technology in Bangladesh. It was first introduced by implementing UDDT projects in rural areas of Comilla District in 2004. Japan Association for Drainage and Environment (JADE), a Japan based Non-Profit Organisation (NPO), was one of the main actors to introduce UDDTs with the help of Bangladesh Advance Rural Development (BARD) as a local partner.

Several studies have revealed the high rate of acceptance of technologies related to urine diversion/separation in non-Muslim communities in the world (see for instance [14,19]). However, very few systematic research projects have been conducted analyzing the introduction of UDDTs in Muslim communities. Some studies and project works have been executed, for instance, [13] showed that UDDTs were opposed by rural Muslim communities in Pakistan and instead flush toilets were in favored. The study addressed cultural preferences as a key factor in planning and implementing low-cost sanitation technologies such as UDDTs. A study by Martin et al. [12] in rural Indonesia where majority of people were Muslims revealed that most

of the people accepted the technologies and they were willing to consume agro-products produced by using fertilizers from urine diversion toilets [24]. undertook a project appraisal on behalf of Swedish International Development Corporation Agency (SIDA) and Palestine Hydrology Group (PHG) which investigated the social acceptability of UDDTs in Palestine. The major objectives of the project were to protect surface water, spring water and ground water which were polluted by open disposal of wastewater and greywater to the water-bodies and open spaces, protect the environments, and to develop the capacity of Palestinian sanitation professionals. The concept of ecological sanitation was easily understood by the participating communities. There were no strong taboos against handling material of fecal origin in Palestine. The design was well adapted to the local defecation practices. The high, even luxurious, finishing standard of the toilets no doubt contributed to the acceptability as did the fact they were heavily subsidized and provided for free. The appraisal reported that the project would not be sustainable due to the high rates of subsidy among the non-poorest households in the project area. They proposed to provide subsidy only below poverty line. The project was ecologically and socially sustainable with success, but no financial sustainability reported. They recommend to do research, development and advocacy on recycling of urine, sanitized feces, and anal cleansing water and greywater for closing the loop of sanitation. A study conducted by Sakai et al. [17] in Bangladesh showed that most of the UDDT users were more satisfied to use their toilets than users of other toilet types such as pit latrines and hanging toilets. The UDDT users were satisfied due to clean, no bad odor, and felt non-disgusting. They even recognize human excreta as resources in the study area.

Our study was conducted in rural areas of Comilla District, Chittagong Division of Bangladesh. This is the area where UDDTs were first introduced in Bangladesh on a pilot scale in 2004 and the area is dominated by Muslim communities. A structured questionnaire survey, key informant interview, focus group discussion (FGD), and mass gathering were carried out to assess the socio-cultural acceptance and scope of replication of UDDTs and the factors/drivers behind the acceptance. The study was conducted in the period of February and March 2011.

## 2. Materials and methods

### 2.1. Study area

The study area is situated in Comilla District under Chittagong Division of Bangladesh. Six villages in three unions of Comilla Sadar Upazilla were targeted. Fig. 1 shows the study area.

The study area was selected because (1) It has a sufficient numbers of UDDTs (over one hundred), (2) It has a practice of using UDDTs long time (5–7 years) compared with other project areas of UDDTs in Bangladesh, (3) There was easy access and communication to all villages, (4) Use of both UDDT products (urine and feces) on farmlands is being practiced, and (5) The area was reported to have achieved social acceptance of UDDTs in rural Muslim communities.

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