



Assessment of Practices of Sanitation and Hygiene in Rural Bangladesh: A Comparison of a Declared Sanitation Area to a Non-declared Sanitation Area of Sirajganj District, Bangladesh

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Abstract

Poor hygiene practices and inadequate sanitary conditions play major roles in the increased burden of communicable diseases within developing countries. This research investigated and evaluated the availability of information and practices of hygiene among the rural people in a declared sanitized area to a non-declared sanitized area in Sirajganj District, Bangladesh. The data were collected and compiled separately for two Upazilas of Sirajganj District, namely, Kamarkhanda upazila (study area A) declared as 100% sanitized area where DPHE/UNICEF implemented SHEWA-B project and Raiganj Upazila (study area B), where no NGOs implemented their activities regarding health and sanitation. In line with the FGD and multistage sampling approaches, three primary sampling units' namely the adult female member of the household who is in charge of her household's day-to-day activities related to water, sanitation, and hygiene, head of educational institutes and key informants of the local NGO project implementing health and sanitation were identified for the survey. Hygienic practice is important when people get adequate hygienic education and information which was well reflected in study area A. Electronic media can play an important role in dissemination of hygienic education and information which we found in study area B where 90% respondent described the role of electronic media regarding their source of information. However, 100% sanitation was not achieved even in a declared area because people do not practice or follow the rules of hygiene regularly.

Keywords: *Practices of Sanitation and Hygiene, developing countries, multistage sampling, household survey, key informant, 100% sanitation*

Introduction

Improving global access to clean drinking water and safe sanitation is one of the least expensive and most effective means to improve public health and save lives (Montgomery and Elimelech, 2007). Several studies show that, improved hygiene (hand washing) and sanitation (latrines) have more impact than drinking water quality on health outcomes. These practices can reduce diarrhoea, parasitic infections, morbidity and mortality, and increase child growth (Esrey *et al.*, 1991; Fewtrell and Colford, 2004). Innovative approaches are required to ensure the availability of low-cost, simple, and locally acceptable water and sanitation interventions and integrating these approaches into existing social institutions, such as schools, markets, and health facilities (Rheingans *et al.*, 2006). Water quality improvements, especially those focusing on households, or point-of-use (POU) level treatment with chlorine, filters, solar disinfection, or other means, along with safe storage were effective in reducing diarrhoea incidence. Interestingly, improvements in water supply (e.g. new wells, connections to piped water) were the least effective in reducing diarrhoea incidence (25% reduction) and showed the greatest variability depending on the quality of the new source (Fewtrell and Colford, 2004). Based on extensive

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research, WHO and UNICEF have identified hand washing with soap (or ash or other aid) after defecation and before preparing food; safe disposal of faeces and use of latrines; safe weaning food preparation, water handling and storage as the key hygiene behaviors. A recent review of all the available evidences suggests that handwashing with soap could reduce diarrhoea incidence by 47% and save at least one million lives per year (World Bank, 2003). Hygiene promotion is most successful when it targets a few behaviours with the most potential for impact. This is consistent with other studies, which found that 12 hand-washing interventions in 9 countries achieved a median reduction in diarrhoea incidence of 35% (Hill *et al.*, 2001).

The UN Millennium Development Goals (MDG) aim to reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation by the year 2015 (UN, 2000). Bangladesh ranked among the top performing countries in the 1990s in the extent of improvement in the UNDP Human Development Index and it is among the few developing countries that are on target for achieving most of the Millennium Development Goals (World Bank, 2005; Government of Bangladesh (GOB), 2007). During the 1980s, the provision of safe water was given priority and budget allocations were set for the construction of sanitary latrines for poor people in rural areas. The performance of Bangladesh in providing the safe drinking water has been very impressive but sanitation coverage in rural areas has been far behind the expectations. Sanitation coverage's was only 2% in 1980-81, reaching 35% in 1995 (Hadi, 2000). In the last two decades, Bangladesh has emerged as the leader in experimenting and implementing innovative approaches to rural sanitation in Asia. The turning point for the sanitation movement in the country came with hosting the First South Asian Conference on Sanitation (SACOSAN-I) in 2003 wherein the GOB announced its target of 'Sanitation for All by 2010', keeping its commitments to the MDG targets. This commitment has amply been reflected in the first National Strategy for Accelerated Poverty Reduction (NSAPR) (GOB, 2005). The sanitation issues are likely to be adequately addressed in the second National Strategy for Accelerated Poverty Reduction (NSAPR, 2008). To achieve the targets, the government has emphasized improving sanitation as a national priority. Efforts were taken to improve the water, sanitation and hygiene situation of rural Bangladesh, which not only contribute to MDG 7 (target C) to halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation; they also contribute to MDG 4 to reduce child mortality by two-thirds. In response to the global call, the GOB set its national target of achieving 100% sanitation by 2010 which is much ahead of MDGs target. Various government departments and nongovernmental organizations (NGOs) have started focusing at financing programs that were aimed at the development of water schemes and other health interventions. The Sanitation, Hygiene Education and Water Supply in Bangladesh Programme (SHEWA-B) is a large project being implemented by the GOB and UNICEF, supported by the United Kingdom's Department for International Development (DFID). This intervention is among the largest intensive hygiene/sanitation and water quality improvement program ever attempted in a developing country (DPHE/UNICEF, 2008).

Access to and utilization of information on improved ways of living is a prerequisite for modernization process of any human being, as 'information is power'. It helps the individual to be more rational, increases the decision making abilities and also improves the standard of life. It

is, therefore, a process of self-empowerment. Denial of access to information curtails the chance of utilization of information; that in turn curtails self-empowerment. This is why communication and information flow is considered to be the main agendum in the development strategies of the third world presently (Regassa *et al.*, 2011). Intending to understand more about the problems in the purpose of being a solution has led to this study, whose objectives were to find out the sources of hygienic education and information regarding the villagers' behaviors on hygienic practices, to assess the water quality and the reasons behind which most of the people are not practicing safe sanitation was done by the assessment of the present situation of sanitation to a 100% declared sanitized area to a non declared sanitized area.

Materials and Methods

Respondents

This research investigates and evaluates FGD approaches to rural sanitation validated in Sirajganj District, Bangladesh, based on literature review and secondary data collection. In line with the programme interventions three primary sampling units' namely household, educational institutes and key informants of the project were identified for the survey. For the household survey, respondents were the adult female member of the household who had knowledge of her household's day-to-day activities related to water, sanitation, and hygiene. The choice of a female respondent was based on the fact that they are usually responsible for collecting and storing water and for maintenance of latrine and household cleanliness. Information on water, sanitation, hygiene and other demographic and socioeconomic variables for each sampling unit was collected using a semi- structured open-ended questionnaire. Second key informants of the survey were taken from the project manager of NGOs, dealing with water and sanitary practices at the community and third informants were head of the educational institutes. The survey was conducted in August 2012.

Selection of upazilas and unions

The sample size estimation for the household survey followed a multi-stage sampling procedure where each *upazila* and unions was considered as a cluster. The data were collected and compiled separately for two Upazilas of Sirajganj District, Kamarkhanda and Raiganj Upazila. Five villages were randomly selected from each upazila. Demographic information of the villages was taken prior to the sample collection to determine the sample size. In order to ensure the generalization of the findings to larger population, the study was considered adequate sample respondents for selection through appropriate techniques. The sample size of this study was determined by taking the following assumptions: $Z_{\alpha/2} = 95\%$ confidence level corresponds to the value 1.96 and confidence interval 9.7%, sample size determined for study areas were 100 for each upazilas.

Study area A, Kamarkhand Upazila has an average literacy rate 26.2% (male 32.7% and female 9.2%). Their monthly income is approximately 8000 tk. Operationally important NGOs are BRAC, ASA, NDP, Krishak Samabaya Samiti, Mohila Samabaya Samiti, Tat (weaving) Samabaya Samiti. Health centres includes 1 Upazila health complex, 4 family welfare centres and 2 satellite clinics. The study area was chosen on the basis that a national well known NGO, NDP (National Development program) is working in this area to implement Sanitation, Hygiene Education and Water Supply in Bangladesh (SHEWA-B) project by the GOB (GoB)'s

Department of Public Health Engineering (DPHE) and UNICEF. With the interview of the local project manager of NDP, study area A was declared as 100% sanitized area.

Study area **B**, Raiganj Upazila, on the other hand has an average literacy rate of 21.8% (male 28.2% and female 15.1%). Operationally important NGOs are BRAC, PROSHIKA, GRAMEEN BANK and Ankur Kalyan Sangstha. Among the health centers, 1 Upazila health complex and 9 health welfare centres. However, no NGOs implemented their activities regarding health and sanitation.

Development of Questionnaire for household survey

The questionnaire was designed using information from the questionnaire development literatures (Nath et al 2010, Hoque 2003, BRAC 2008), interview with local NGO manager and a FGD prior to the questionnaire survey. The data generated from FGD informed the content and vocabulary layout of the questionnaire as well as the question categories and answer choices. The questionnaire used both open ended questions (Table 1). Qualitative answers were also taken into considerations. Data entry and data analysis was done using Microsoft Office Excel 2007.

Table 1: Queries on hygienic practices

Hygiene perceptions	Hygiene practices
Issue 1: Upkeep of Personal Hygiene	
1. Unclean / unsafe water on health	1. Hand washing - visibly dirty
2. Unclean/unsafe sanitary conditions on health	2. Hand washing after using toilet or cleaning children's stool
3. Hand washing with soap-water, ash etc	3. Hand washing after handling pets or cattle
4. Infection on contact with other person	4. Hand washing after touching body fluids
5. Washing face with soap and water to prevent eye infection	5. Hand washing before applying medication
6. Contamination from lavatories	6. Hand washing before eating
	7. Wearing shoes when going to toilet
	8. Monitoring of hand washing and wearing shoes of children by mother
Issue 2: Safe storage and handling of drinking water	
1. Uncovered storage and contamination of water	1. Cover drinking water
2. Drinking water contamination	2. Clean utensils regularly before filling drinking water
	3. Touch / dip fingers in water during collection
Issue 3: Safe disposal of human excreta and other wastes	
1. Using sanitary toilet	1. All family members using latrine
2. Hand washing practices of self	2. Practices of hand washing by soap or ash
3. Hand washing practices of children	3. Proper disposal of feces of children
4. Disposal of feces of children	4. Proper disposal of wastes
5. Disposal of other wastes	

Collection of water samples and analysis

In rural areas, most people rely on private water supplies such as wells or adjacent surfaces waters in lakes and rivers. Privately owned water supplies for individuals are not regulated by the government. Therefore, N=10 water samples (5 from each upazila) were collected. The samples

were collected and transported by standard methods as mentioned in APHA (1998). pH was measured by TOA-DKK pH meter, Total coliform (TC) bacteria count was conducted by decimal dilution technique followed by standard spread plate count on Nutrient agar and MacConkey agar plate as described by Sharp and Lyles (1969). Total fecal coliform (FC) bacteria counts were conducted by modified membrane filter counting technique (APHA, 1998). Iron was determined by colorimetric test kit method by The VISOCOLOR® test kits. For determination of arsenic Hach low range arsenic 0-0.5 ppm, and EZ Arsenic High Range Test Kit 0-4 ppm was used.

Results and Discussion

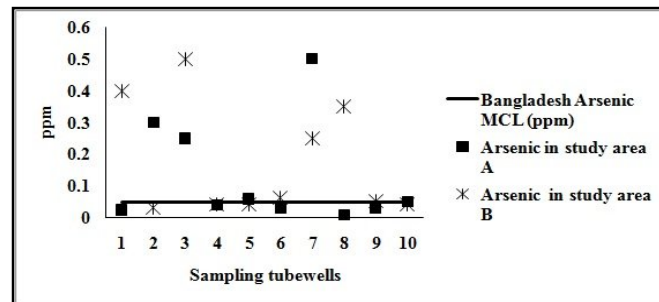
In study area **A**, almost 98% people use sanitary latrine. Main source of drinking water was tube-well of which almost 96% platforms are 'pacca' or cemented. The people of this area are conscious of using sanitary latrine, cutting nails weekly and using shoes before going to toilets. They are conscious of fundamental rules of keeping good health. Whether a child follows the rules of sanitation or not, is regularly checked by their mother. If they are affected by water-borne diseases e.g. diarrhea, they buy oral saline from the local markets or prepare at home. Households in this area had been formally trained by local NGOs regarding practices of health and hygiene.

Sanitation and hygiene education in school also played an important role in disseminating health and hygiene related information in this area. After the family, schools are most important places stimulating learning environment for children and stimulate or initiate changes of certain behavior. If sanitary facilities in schools are available, they can act as a model, and teachers can function as role models. Schools can also influence communities through outreach activities, since through their students; schools are in touch with a large proportion of the households in a community. UNICEF and its partners have a strong school focus to both promote better hygiene behaviors and increase sanitation practices of the community. Schools are assisted in installing latrines, for both boys and girls, and safe water sources. In primary schools, children from class 1 to 5 have weekly lessons on safe water, sanitation and hygiene. They are also encouraged to pass on what they have learnt to other children and to their families and communities to spread the information on good hygienic practices. These lessons are taken a step further in "student brigades" created by SHEWA-B project. Student brigades are responsible for cleaning the surrounding school premises as well as the school latrines, classrooms, spreading hygiene messages among their neighbors, conducting surveys, and participating in rallies and fairs. With our interviews of the head of the local educational institutes we learned the effectiveness of the student brigades in maintaining sanitation and the dissemination of information regarding sanitation in the study area. They even visit the homes of students who have missed a few days school to see why their peers have not been attending. Student brigades also teach boys about housework, a skill they might not otherwise learn in the patriarchal society.

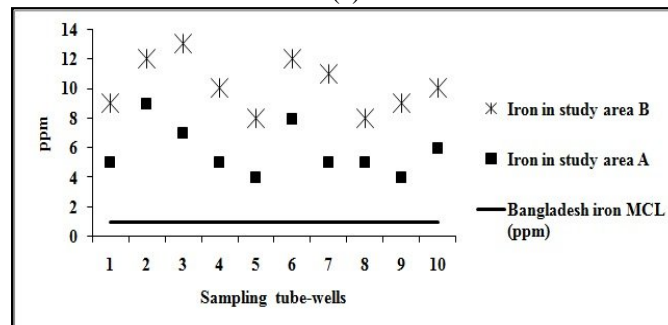
On the other hand, in study area **B**, no NGO's implemented any health and hygiene related awareness program. From our survey we found primary schools in this area gives lessons on safe water, sanitation and hygiene according to their textbook, however it was not adequate and there was also no monitoring whether the children follow the hand washing and other cleanliness practices. Similarly, elders also found to lack of knowledge on health and hygiene practices. More than 90% respondent answered about the role of television and radio advertisement in this regard,

while nearly 10% answered about the role of family, friends and neighbors role in getting information in this regard. Watching and listening to public awareness raising advertisement, such as hand washing practices using soap and ash before taking meal, food preparation and after using toilet was found to be effective among the elders.

Sources of drinking water were mainly groundwater from deep tube-wells and shallow tube-wells in both upazilas. 100% respondents answered positive regarding the source of using ground water for drinking purpose. In the study areas people faces different types of problem for their privately owned tube-wells in water quality. 10 tube-wells were randomly selected for the survey of water quality parameter of pH, arsenic, iron and coliform bacteria. Water pH was found within the range of Bangladesh standard (6.4-7.6). However, the main problem was found in the water quality was iron and arsenic (Figure 1 (a) and 1(b)). Three tube-wells in study area A and four tube-wells in study area B were found to exceed Bangladesh standard maximum contaminant level (MCL) 0.05 ppm. For iron all the tube-wells were found to exceed the Bangladesh standard of 0.3-1 ppm. Coliform bacteria which was also tested during the survey was absent in all tube-wells, except the canal water of study area B where a few people were found to use it for their domestic use i.e. washing & bathing.



(a)



(b)

Figure 1. Presence of arsenic (a) and iron (b) in the tube-well water

Type of container used in storing drinking water was pitcher with cover. More than 95% of the respondent was found to wash their storage equipments regularly with ash and coconut coir. Few respondents were found to clean with soap. Majority of the respondents spontaneously described

filtered water as the safest drinking water. Other response from FGD participants regarding safe drinking water was:

1. Piped water supplied by government authorities
2. Tube well water
3. Water purified by tablets
4. Water free from arsenic
5. Water extracted from underneath the ground
6. Water of tube well with cemented platform
7. Water purified with potash alum
8. Rainwater
9. Water boiled for 20 min.

However, in the both study areas households were not found to purify tube-well water for drinking purpose. This can be attributed to mainly three factors – habits, lack of awareness on safe water, and lack of resources (energy for boiling, extra expense, technical knowledge etc.) for water purification. In the study area **A**, 96% of the tube-wells water platforms were found cemented and 4% found kaccha. On the other hand in study area **B**, 70% tube-well platforms were found cemented and 30% found kaccha. Cleaning tube-well platform on regular basis plays an important role in ensuring safe water and this duty falls on the women. In both study areas, women were not much willing in cleaning the platforms. Their unwillingness in mostly recorded was ‘heavy household work’, ‘less time for cleaning’.

From the survey work it was found that maximum households use sanitary latrines. Our key informant, local manager of NDP informed about 100% people using latrines in study area **A**. Here sanitary latrine means ring slab latrine with water seal. In the study area **A** about 98% people use Ring slab latrine with water seal, while in study area **B**, 72% people using Ring slab latrine with water seal. The percentage of hanging latrine was found zero in both study area (Figure 2). Only the apparently hygienic latrines (latrines having water seal and reservoir below sealed with impervious layer) were observed regarding their distance from the drinking water sources. Other key observations include external structure, bad smell around, leakage in the pipe/tank, cleanliness inside, adequacy of water supply, and visibility of soap in or around. It was observed that in majority of the situation the distance between the drinking water source and the latrine was within 6 meter. Only 30% could answer correctly about the sanitary toilets. ‘No foul smell’ came out as the most frequently mentioned feature of a hygienic latrine mentioned by the people of study area **A**. ‘The feces cannot be visible’ was also mentioned by some respondents. The other relatively more frequently mentioned responses were “Water sealed”, no access of insects and sanitary latrine. Young generation also characterized the ‘hygienic latrine in a similar manner. Respondents in both study area wear shoes before going to latrines. 94% in study area **A** and 92% in study area **B** mentioned that wearing sandal while going to latrine was to keep the feet clean. Proportionally much less but significant proportion of respondents could rightly mention the suggested reason for wearing sandal as, ‘To protect from worms’, ‘To prevent germs’ and ‘To avoid diarrhea’ were the two other frequently mentioned responses in study area **A**.

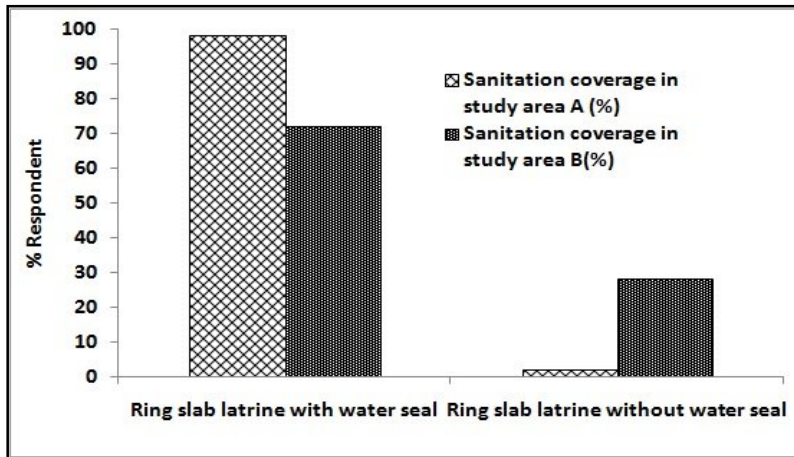


Figure 2: Percentage of people using different types of latrines

Water is necessary for hygiene. Many “waterborne” diseases are actually “water-washed” diseases due to inadequate quantities of water available for washing hands, food, laundry, and cooking utensils (Bradley 1977). Hand washing is universally promoted in health interventions in this regard. Studies in Bangladesh and elsewhere have shown a 14-40% reduction of diarrhoeal diseases with hand washing (Hoque 2003). 100% mothers in study area **A** and 94% in study area **B**, interviewed during the survey agreed about practicing hand washing after using toilets with soap and ash. Regarding hand washing in other times for example, food preparation, taking meals, during feeding children and cleaning children feces, taking care after touching animals 92% mothers agreed about cleaning hands in study area **A**. However, in answer to the same questions only 56% mothers agreed in study area **B** (Figure 3).

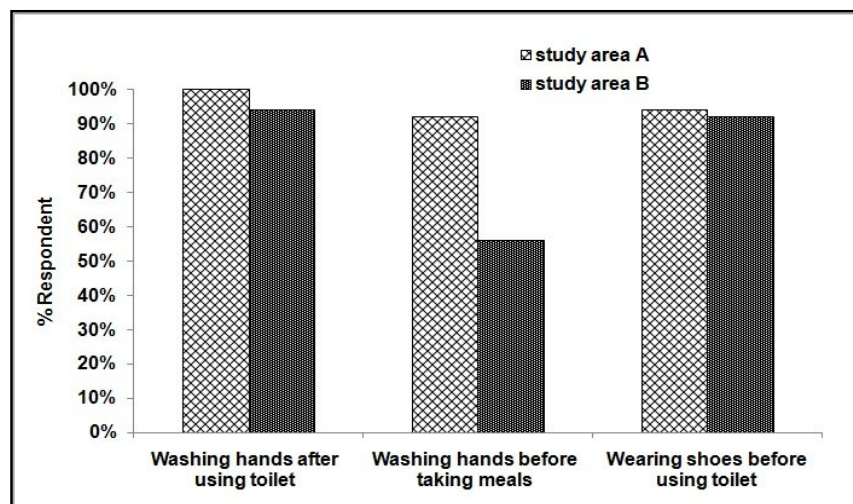


Figure 3. Hand washing practices by mothers

Monitoring hand washing practices of children as well as monitoring of wearing shoes or sandals in toilets by mothers can play an important role in reducing waterborne diseases among children. 96% mothers in study area **A** and 54% mothers in study area **B** were found to monitor children's hand washing practices. 90% children in study area **A** and 60% children in study area **B** were found to wash hand after using toilet with soap and others. In the question of children cleaning hands before taking meal, the respondent was found to be same in both area 80% and 82% respectively for study area **A** and **B** (Figure 4).

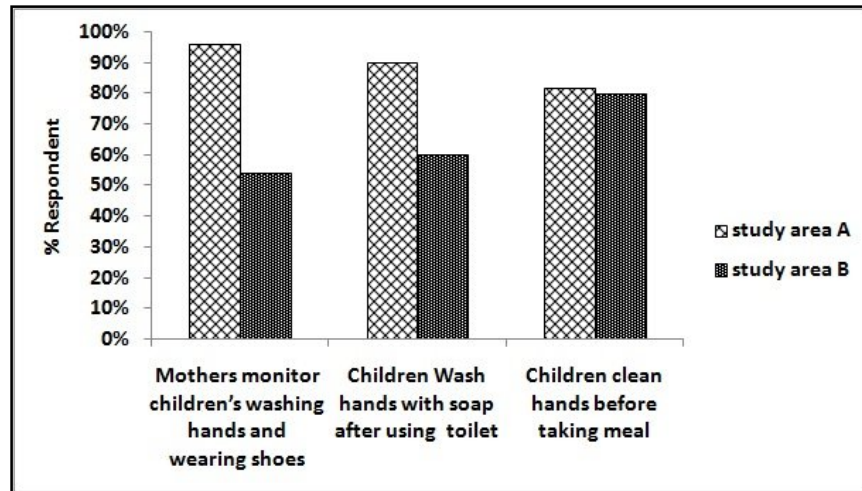


Figure 4. Hand washing practices of children monitored by mothers

Waste management related information is very important issue in maintaining health and hygiene of the household. Safe disposal of children excreta is very important in this regard. In study area **A**, only 36% respondents found to dispose their wastes (all types including children excreta) in a fixed place while 64% respondents throw their wastes randomly. In study area **B**, the situation is much worse with more than 90% respondents throwing wastes randomly. Only 10% respondents answered to throw their wastes in a fixed place. The respondents were also asked to answer the questions whether in the past 6 months they had suffered from any waterborne diseases. In study area **A**, 18% and in study area **B**, 52% respondents positively answered regarding suffering from waterborne diseases.

There is a strong relation among the access to sanitary latrine, safe drinking water and hygienic practice. To maintain a sustainable environmentally and healthy life all three ingredients, i.e., sanitary latrine, safe drinking water and hygienic practice - are being required. Bangladesh has demonstrated the positive and realistic way of promoting sanitation and hygiene under some of the most difficult situation such as poverty and high illiteracy rate. Both Government and NGOs have already taken various awareness programs, yet a huge number of people especially, the low income and less educated rural people do not know didn't know what criteria make a toilet as the sanitary one. Adding to the challenge, about one-third of Bangladesh experiences annual floods

and other parts of the country suffer seasonal water shortages. All of these factors have implications for the ability of rural Bangladeshis to construct and maintain latrines. However, awareness is growing among the rural people regarding the usages of latrine properly. Open defecation percentage is almost zero. Thus we have seen many families in our study areas using sanitary latrines and follow the basic rules of hygiene, washing hands properly, maintaining general rules of hygiene and management of wastes in a proper way. But still, 64% respondents in a declared sanitized area lacks access to facilities that safely confine human feces, which puts them and their neighbors at risk of diarrheal disease. This is surely an obstacle to achieve 100% sanitation. The reason behind the obstacles that we found were lower level of education, lack of economic capabilities, lack of awareness and willingness to practice hygiene.

Conclusion

There is increased interest from developing country governments and the international community in seeking ways to rapidly scale up access to improve sanitation. Because Bangladesh has had sanitation programs longer than most countries, including periods of rapid scale up, it can provide valuable lessons to donors and program implementers throughout the world. The lesson learnt over the years on the promotion of sanitation and hygiene activities should be provided. The present condition of sanitation is far behind the expectation in Bangladesh. It is widely agreed that the MDG targeting a 50 percent decrease in the proportion of people who do not have access to safe drinking water and sanitation (MDG 7, Target 10) has achieved less progress than all other MDGs. For improving the sanitation condition the responsible authority may provide a clear and transparent idea to the all level of community people about what should be in sanitary latrines by providing models. The responsible authority also might consider the following recommendations as to let the people know and understand the importance of sanitary toilet and hygienic practices in their daily life, that sanitation and hygienic practices is simply nothing but the habitual practices of everyday life. Motivation from individual to social level may also help to improve the situation. Social and community discussion program and motivation activities may also improve the level of hygienic practice. We have also found the similar experience in student brigade program in SHEWA-B project in study area **A**. Role of electronic media should be mentioned here regarding the changes of rural people awareness and changing behavior towards hygienic practices. As in our case we have found more than 90% respondent in study area **B** gets hygiene related information from radio and television. Proper monitoring is also required from the responsible authority to run the project or program that is being taken to improve the situation effectively. Government should carefully ensure the validity of the declaration of an area as a 100% sanitation area as very often a massive variation was found between the declaration and the actual scenario. Finally by implementing appropriate program and new ideas, it is possible to improve the sanitation coverage in rural areas of Bangladesh with the direct involvement of all level of people.

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