

Fifth South Asian Conference on Sanitation, Nepal, 2013

Impact on health and health costs due to improved access to safe water, improved sanitation, safe hygiene practices and reduced indoor air pollution: a case study from Nepal

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ABSTRACT:

The top two killer diseases in the low-income countries is due to exposed risks of Indoor Air Pollution (IAP) and Water, Sanitation and Hygiene (WASH). Strengthening Water Sanitation and Hygiene Treasuring Health (SWASHTHA) adopted an integrated approach to reduce the health risks due to IAP and WASH. A combination of three approaches - Community Led Total Sanitation (CLTS), Household Centred Environmental Sanitation (HCES) and School Led Total Sanitation (SLTS) was applied for sustainable promotion of IAP and WASH interventions. A Health Impact Study conducted by the project revealed that there was (i) 22.5% reduction in the incidence of water borne diseases, (ii) 82.2% decrease in incidence of Acute Respiratory Infection (ARI) and eye related diseases and (iii) 94% reduction in the health costs.

Keywords: WASH; IAP; water borne diseases, health impact and cost

Introduction

In Nepal, 89% of the population has access to improved drinking water sources and 31% has access to improved sanitation (additional 20% with shared and unimproved sanitation), *Progress on Drinking Water and Sanitation: 2012 Update*. Despite the gradual achievements in water and sanitation, still a significant proportion of the country's population lack access to water and sanitation facilities and the gap of people's access to water supply and sanitation facilities stands as a big challenge in achieving the perceived health benefits from water supply and sanitation services.

The lack of access to safe drinking water, sanitation facility, safe hygiene behaviour and exposure to indoor air pollution has adverse effect in the health of people. A study conducted by the World Health Organization in 2008 and updated in June 2011 states that the first two major causes of death in low-income countries is due to diseases resulting from IAP and WASH (out of the 163 deaths in 1000, 18 would come from lower respiratory infections and 13 from diarrhoeal disease), *Fact sheet: The top ten causes of death (Fact sheet no 310)*, 2011. It is estimated that annually 12,700 children under-five die of ARI and diarrhoeal diseases due to poor hygiene and sanitation, Government of Nepal, 2011. The health expenditure on water and sanitation related diseases per year is NPR 2.2 billion and 3.60 billion respectively and the economic cost of inadequate sanitation results in productivity loss equivalent to NPR 10 billion annually, *Sanitation and Hygiene Master Plan*, 2011.

Strengthening Water, Air, Sanitation and Hygiene Treasuring Health (SWASTHA) is a four-year project implemented in 21 urban and peri-urban settlements in four municipalities i.e. Bharatpur, Butwal, Gulariya and Tikapur, Nepal to improve health and well-being of the communities. The project was financed by European Union (EU) and UN-HABITAT and implemented by Practical Action, MuAN (Municipal Association of Nepal), ENPHO (Environment and Public Health Organization) and respective municipalities. The objective of the project was to develop and promote integrated approaches by addressing major environmental health risks, such as indoor air quality, water quality, sanitation facilities and hygiene behaviours to create healthy homes and benefit 30,000 women and children. Although access to drinking water was reasonably good in the urban poor clusters of the four municipalities (varying from 41% to 99%), the proportion of people adopting any water treatment options before consuming was poor (only 2% in Gulariya going up to 36% in Butwal municipality). The access to improved sanitation varied from a minimum of 18% in Gulariya to a maximum of 88% in Butwal.

SWASHTHA project adopted an integrated approach to reduce the health risks due to IAP and WASH (Figure 1). A combination of three approaches - Community Led Total Sanitation (CLTS), Household Centred Environmental Sanitation (HCES) and School Led

Total Sanitation (SLTS) was applied for sustainable promotion of IAP and WASH interventions.



Figure 1: Integrated approach of the SWASHTHA project

Material and Methods

In order to assess the health impacts/benefits and reduction in health costs associated with IAP and WASH related diseases, a Health Impact Study was conducted by CDC Group (external/independent consulting study) in four municipalities, where the SWASHTHA project was implemented. The study collected information from households using intervention and control areas in municipalities. In each of these municipalities, four various tools namely (i) household survey (questionnaire); (ii) Focus Group Discussions; (iii) semi structured questionnaire for Key Informant Interviews and (iv) school observations were used.

The study area covered 25 clusters within four municipalities (Bharatpur, Butwal, Gulariya and Tikapur) among which 21 clusters were taken from project intervened clusters and remaining four were taken as control clusters having similar socio-economic characteristics using purposive sampling technique to collect primary data. Findings from control (non-project clusters) sample are used as a reference citation rather than to give comparative figures against the intervention (project clusters) sample. A total of 368¹ samples were taken for the intervened and control clusters (See Table 1).

Table 1: Sample size

Municipalities	Total	Program		Control		Total	
		M	F	M	F	M	F
Bharatpur	92	36	36	10	10	46	46
Butwal	92	36	36	10	10	46	46
Gulariya	92	36	36	10	10	46	46
Tikapur	92	36	36	10	10	46	46
Total	368	144	144	40	40	184	184

The samples for household survey (questionnaire) per cluster was selected on the basis of probability proportional to size (PPS) with appropriate interval. The study team randomly selected one cluster in order to identify an index house to start the interview in the sampled cluster. The index households were identified by using spin the bottle method. All women and men (aged 18 to 60 and above) living in the sampled households was considered

¹ Sample size is determined using the standard of 95% confidence level and 5% of confidence interval and 25% response distribution in 30,000 total population of project beneficiaries

as respondents. Eligible male and female of the sampled households were selected for interview. Interviews were conducted in different times of the day: morning, lunch hour and afternoon at the place convenient to respondents.

Focus Group Discussions were conducted in separate groups and participants for FGD were selected having similarity in terms of education, ethnicity, socio-economic status to form as a homogenous group for each individual FGDs. A list of relevant stakeholders comprising Project Management Committee, Female Community Health Volunteers, mother leaders, WATSAN Volunteers, School management Committee, Child Clubs, TLO, and municipalities were identified for the KII. The sampled stakeholders from each of the municipalities were interviewed using the semi-structured questionnaire. For school observations, all the public schools (within the project clusters) were listed and sampled randomly in all four municipalities.

Results and Conclusions

Table 2: Percentage reduction in incidences of ARI and eye related disease and water borne diseases

Description	Bharatpur		Butwal		Gulariya		Tikapur		Total (%)		Reduction (%)
	Before	After	Before	After	Before	After	Before	After	Before	After	
Incidences of water borne diseases	17.7	13.9	42.5	27.8	46.3	41.7	31.5	23.6	34.5	26.8	22.5
Incidences of ARI and eye related diseases	14.1	2.8	21.1	0	18.5	6.9	16.7	2.8	17.6	3.1	82.2

The study revealed that there was 22.5% decrease in incidence of water borne diseases in the project intervened clusters (Table 2).

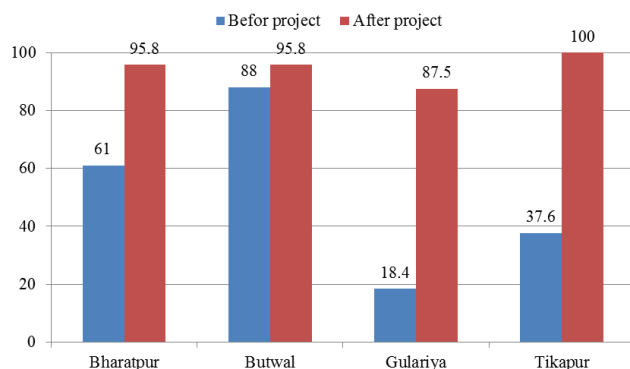


Figure 2: Access to sanitation facility before and after the project interventions

The access to sanitation facility in the clusters within the four municipalities increased significantly after the project interventions (Figure 2). There has also been a significant increase in adoption of Point of Use (PoU) water treatment options and it was found that the use of water filter has increased from 31.7 to 89.3%. It was also found out that hand washing at critical times (before eating, after eating, before cooking meal, after working in dust, after defecating, after cleaning children defecation) has increased significantly like hand-washing after defecating has increased by 71% and cleaning children defecation has increased by almost 93%. It could be concluded that increased access to drinking water, sanitation facility, adoption of PoU water treatment options coupled with safe hygiene practices has resulted in the decrease in incidence of water borne diseases.

The incidence of ARI and eye related diseases has decreased by 82.2% in all the project municipalities. This is due to the fact there was an increase by 59% households

having separate kitchen and increase in 232% households having an improved cooking stoves. Households having separate kitchen reduced exposed time to indoor air/smoke as well as adopting improved cooking stoves reduced the indoor air pollution inside the kitchen resulting in a significant decrease in the reduction of ARI and eye related diseases.

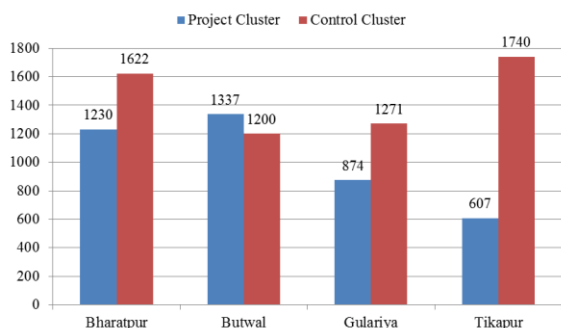


Figure 3: Health expense for children aged under-five (three months average) in project and control clusters in the four municipalities

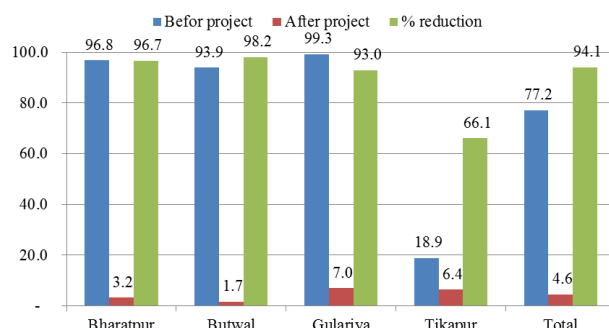


Figure 4: Health expenses (cost of treatment for diseases related to IAP and water-borne diseases) in households before and after project interventions in the four municipalities

The study showed there was sizeable difference in health expenses for children aged under-five in project and control clusters (Figure 3). The study also showed drastic reduction in health expenses (cost of treatment for diseases related to IAP and water-borne diseases) of the target population in four municipalities where the health expenses decreased from 77 to 4.6% (Figure 4). The percentage decrease of the health expenses is 94% in the entire project areas into all four municipalities. The trend and practice of health expenses vary with different socio-cultural and economic context of the communities in the project clusters. It could be concluded that health expenses have reduced due to decrease in incidences of related diseases (as already mentioned) indicating improved health of the communities. It was also observed that health expenses in project cluster is more than control cluster in Butwal, which could be attributed to increased level of awareness in seeking health care and behaviour in the health facilities.

Overall, it could be concluded that adopting integrated approach of WASH and IAP and applying combination of three approaches: CLTS, HCES and SLTS for sustainable promotion of the interventions has enabled the communities with improved and sustainable access to safe drinking water, improved sanitation facility, safe hygiene practices and reduced indoor air pollution that has brought significant improvement in their health and reduction in health costs.

References

Fact sheet: The top ten causes of death (Fact sheet no 310), 2011, World Health Organization, Geneva, Switzerland.

Progress on Drinking Water and Sanitation: 2012 Update, 2012, WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation.

Sanitation and Hygiene Master Plan, 2011, Steering Committee for National Sanitation Action, Nepal.

About Author

The Author is working as the Head of Programme, Urban Water, Sanitation and Waste at Practical Action South Asia Regional Office. He possesses a doctoral degree in sanitary engineering and water pollution control. He is a qualified and experienced professional in the field of water and sanitation and has more than a decade of practical experience in India, Nepal and Pakistan. He has authored papers/manuscripts in (inter)/nationally peer-reviewed journals and publications.