

Situation of Water, Sanitation and Hygiene and Diarrhoeal Diseases After Open Defecation Free Declaration

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ABSTRACT

Background: Makwanpur district was declared Open Defecation Free in 2013 as the movement started in Nepal since 2003 to address the high burden of diarrhoeal disease among under five children. As the water supply, sanitation and hygiene situation of the district is not known after the declaration, the need for this study was visualized.

Methods: It was a cross sectional study among randomly sampled 178 households using interview and observation. Water, sanitation and hygiene situation was assessed in terms of related facilities, knowledge and practices of mothers. Results were compared with the standard open defecation free criteria of Nepal. Five years trend of diarrhoeal disease was analysed from the health facility records to assess the impact of declaration.

Results: Of the total households 92% had toilets and 90% had access to improved water source. About 79% mothers had high knowledge on safe water, sanitation and hygiene and 43% practiced hand washing with soap at critical times. Proper disposal of solid and liquid waste was found among 32% and 46% of households respectively. About 68% of households had good water, sanitation and hygiene situation and was found to be significantly associated with related knowledge among mothers irrespective of their economic status. Diarrhoeal disease among under five children was found declining after open defecation free declaration.

Conclusions: Water, sanitation and hygiene status in the study area is found lower than the criteria for open defecation free declaration. However, diarrhoeal disease among children under five is declining after the declaration.

Keywords: Diarrhoeal disease; Makwanpur; ODF; WASH.

INTRODUCTION

Despite a significant progress in reducing child mortality and morbidity from 1996 to 2016, burden of water, sanitation and hygiene (WASH) associated diseases remains high in Nepal.¹ The diarrheal disease is the second largest killer among under five children in Nepal.² As efforts to address the diarrhoeal disease through improved sanitation situation, Community Led Total Sanitation, a part of ODF movement started in Nepal since 2003.³ By the end of August 2017, about 27 districts have been declared ODF.⁴ Makwanpur district was declared in 2013.⁵ As a component of the programme for preparation to the next phase of total sanitation, follow up assessment was not conducted in Makwanpur district after declaring ODF. Therefore, this study was conceived with objective to assess the post ODF situation of sanitation facilities and hygiene practice in Makwanpur district.

METHODS

Study was conducted in Churiyamai VDC (now Churiyamai consists of 16, 17 and 18 wards of Hetauda Municipality) Makwanpur with 14,274 population.⁶ A cross sectional study was conducted through face to face interview using pretested questionnaire and observation checklist from Nepal Demographic Health Survey 2011 and Nepal Sanitation and Hygiene Master Plan 2011. These tools were used to assess the WASH situation of households. WASH situation of households was assessed in three areas namely WASH related knowledge among mothers, WASH related facilities and WASH related practices among mothers. For the calculation of wealth quintile of households, principal component analysis (PCA) was done. About 14 variables were included namely the possession of television, cupboard, fan, mobile, LPG gas, bicycle, motorcycle, ownership of land, amount of land possessed, possession of any livestock, access to toilet facility, electricity, piped water supply and house type

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for calculating wealth index which placed the individual households on a continuous scale of relative wealth. The relative continuous scales of household wealth index were again classified into three classes such as lowest, medium and highest wealth quintile for the study.

Study population was mothers having children below five years age selected using systematic random sampling. Sampling frame was obtained from health facility records of Vitamin A distribution. Sample size was derived by using the formula for known population⁷, $n = \frac{NZ^2PQ}{e^2(N-1)+Z^2PQ}$ (where, n = required sample size, N = total eligible mothers, z = percentiles of the standard normal distribution corresponding to 95% confidence level which is equals to 1.96, P = Percent of households having toilet is 85%. With the addition of four percent non response rate¹, the total sample was 178 households. Data was analyzed using SPSS version 21.

RESULTS

Table 1 shows majority of the study participants (81%) were Tamang. Half of them lived in nuclear family. About 74% followed Buddhism as their religion. Majority of mothers (83%) were doing household chores as their main occupation. Out of total mothers, 99% were able to read and write.

Table 1. Socio-demographic characteristics of mothers (n=178).

Characteristics	n (%)	Characteristics	n (%)
Caste/ethnicity		Major occupation	
Tamang	146 (82.0)	Household work	147 (82.6)
Others	32 (18.0)	Business	13 (7.3)
Type of family		Agriculture	
Nuclear	90 (50.6)	Daily wages	13 (7.3)
Joint/extended	88 (49.4)	Education status	5 (2.8)
Language spoken		Literate	
Tamang	118 (66.3)	Illiterate	2 (1.12)
Nepali	60 (33.7)		
Religion			
Buddhist	121 (68.0)		
Hindu	57 (32.0)		

Table 2 indicates about 80% of the mothers had knowledge about hand washing at the critical times. Almost all

mothers had knowledge about at least one method of water purification. Knowledge of mothers about proper methods of solid and liquid waste management was found to be 66% and 77% respectively. Majority of mothers (79.2%) were found to have high knowledge about WASH with 6-9 scores.

Table 2. Knowledge of mothers about WASH (n=178).

S.N	Knowledge on	Number	Percent
1	At least one method of water purification (boiling, chlorination, filtration, solar water disinfection, sedimentation and filter with a cloth)	176	98.9
2	Hand washing with soap before eating	142	79.8
3	Hand washing with soap before feeding child	113	63.5
4	Hand washing with soap before preparing food	85	47.8
5	Hand washing with soap after defecation	175	98.3
6	Hand washing with soap after cleaning child's stool	173	97.2
7	Hand washing with soap after working in the field	164	92.1
	Hand washing with soap at critical times	852	79.7
8	Proper disposal of solid waste (garbage and refuse)	118	66.3
9	Proper disposal of liquid waste	137	77.0
Knowledge level of mothers about WASH			
	Low (0-5 score)	37	20.8
	High (6-9 score)	141	79.2
	Total	178	100.0

Table 3 demonstrates of the total, 92% households had toilets and 90% of the households had access to improved water source. About 93% of the households used toilets indicating that few households use toilets of neighbors in regular basis. Less than half of the mothers (43%) practiced hand washing with soap at critical times with the poorest practice of hand washing before preparing food. Waste management was found relatively poor among households. About 53% of households had animal shed inside or attached to the house. Proper disposal of solid and liquid waste was found only among 32% and 46% of households, respectively.

Table 3 also depicts 12 indicators of WASH status; two of them demonstrate WASH related facilities and 10 of them shows WASH related practices. All of these indicators were included in the assessment of WASH status with the score of 1 or 0 in each. WASH situation of households was then categorized into poor with 0-6 score and good WASH situation who obtained 7-12 score. More than two third (68%) of households had good WASH status.

Table 3. WASH related facilities and practices of households (n=178).

S.N	Indicators	Number	Percent
WASH related facilities			
1	Access to improved water sources	161	90.4
2	Availability of toilet facility in the family	164	92.1
WASH related practices			
3	Hand washing before eating	92	51.7
4	Hand washing before feeding child	86	48.3
5	Hand washing before preparing food	54	30.3
6	Hand washing after defecation	161	90.4
7	Hand washing after cleaning child's stool	171	96.1
8	Hand washing after working in the field	130	73.0
Total of hand washing with soap at critical times		462	43.2
9	Use of toilet facility	166	93.3
10	Proper disposal of child's feces	75	42.1
11	Proper disposal of solid waste/refusal of the family	57	32.0
12	Proper disposal of liquid waste	81	45.5
Level of WASH status of households			
Poor (0-6)		57	32.0
Good (7-12)		121	68.0
Total		178	100.0

Table 4 shows WASH situation of the households is significantly associated with the knowledge level of mothers. It is 12 times more likely that mothers with high knowledge on WASH have good WASH facilities and practices in their households compared to those mothers with poor knowledge (OR=12.01, 95% CI=5.11-28.24).

However, no association was found between wealth quintile of households and their WASH situation.

Table 4. Factors associated with WASH situation in the households (n=178).

Factors	WASH situation in the households		OR (95% CI)	P-value
	Poor (%)	Good (%)		
Knowledge level of mothers about WASH				
Low	28 (75.7)	9 (24.3)	1	0.00*
High	29 (20.6)	112 (79.4)	12.01 (5.1-28.2)	
Wealth quintile of households				
Lowest	24 (40.7)	35 (59.3)	1	0.02
Medium	20 (33.9)	39 (66.1)	0.40 (0.1-0.9)	
Highest	13 (21.7)	47 (78.3)	0.53 (0.2-1.2)	

According to table 5, some of the WASH related indicators in the study area were not found in place as per the criteria for ODF declaration as stipulated in Sanitation and Hygiene Master Plan, 2011.⁸ Only 92% of households had own toilet against cent percent in the criteria, while all the institutions had toilet facilities. Nearly 6% of the households are still using open field for defecation, and 2% share other households' toilet. Soap for hand washing was available only in 60% of the households. Similarly, the WASH related practices of environment management did not comply with the ODF declaration criteria.

Table 5. Comparison of WASH situation with the ODF criteria.

SN	Indicators	ODF declaration criteria (%)	WASH situation (%)
1	Open defecation in the study area	0	5.6
2	Toilet facility in family	100	92.1
3	Availability of toilets in institutions	100	100.0
	3.1 Schools	100	100.0
	3.2 Cooperatives	100	100.0
	3.3 Health facility	100	100.0
	3.4 Church	100	100.0
	3.5 Other offices	100	100.0
4	Availability of soap and soap case for hand washing	100	60.1

5	General environmental cleanliness		
	Animal shed and house	100	53.0
	Separated Solid waste management	100	32.0
	Liquid waste management	100	45.5

Figure 1 shows prevalence of diarrhoeal disease among children below age 5 in the last 2 months period preceding the survey was 101 per 1000. The trend analysis has indicated the occurrence of diarrhoeal disease among under five children is declining since the declaration of ODF in Churiyamai. It was 641 per 1,000 in 2011 and 346 per 1,000 in 2015 according to the health facility records.

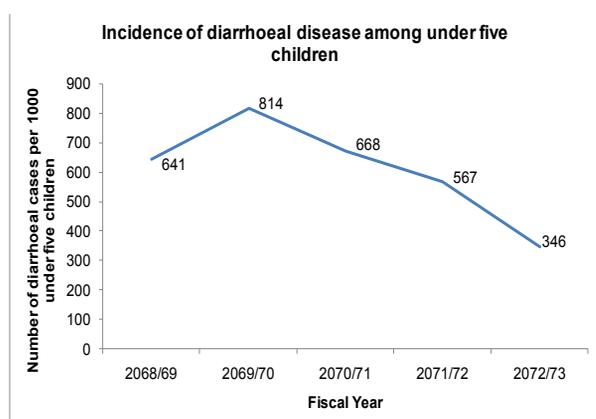


Figure 1. Trend of diarrhoeal disease among under five children in Churiyamai.

Table 6 shows significant association between WASH situation in households and diarrhoeal disease among under five years children. It was found households having good WASH situation are three times less likely to suffer their children from diarrhoeal disease compared to households with poor WASH related facilities and practices.

Table 6. WASH situation and occurrence of diarrhoeal disease among under 5 years children (n=178).

Characteristics	Occurrence of diarrhoeal disease among under 5 children		OR (95% CI)	P-value
	Yes (%)	No (%)		
WASH related situation				
Good	8 (6.6)	113 (93.4)	3.0	0.03
Poor	10 (17.5)	47 (82.5)	(1.1-8.0)	

DISCUSSION

The study has assessed the status of WASH in the study area using multiple indicators. These indicators included both structural and behavioral aspects as dealt below.

The current study shows that 92% households have toilets and 6% use open field for defecation. This situation does not match with the indicators for declaration of ODF which stipulates all households in the study area must have toilets and no one should practice open field defecation.⁸ There could be two possible reasons for this: the first reason could be such that ODF was declared in the study area without meeting the standard criteria; the second reason could be due to deterioration of the condition after declaration of ODF. However, decreasing trend of diarrhoeal disease over the last two years after declaration of ODF has been recorded. It shows that the trend of WASH situation in the study area has improved but the target for decreasing diarrhoeal disease has not been mentioned. Hence, it is likely that ODF could have been declared without proper assessment of the situation prior to declaration. Similar results are found in a study conducted in some of the VDCs of Nepal.⁹ The study findings will have policy implication regarding declaration of ODF, as in some worst situation decision of declaration of ODF was reversed.⁹

WASH related practices are far lower than the ODF criteria. One such criterion set in ODF guideline is use of soap for hand washing.⁸ In current research, soap was found only in 60% of households. Even assuming that members of these households use soap during hand washing, a large portion of households in the study area still washes hands without using soap. Construction of toilets and their uses are not enough without proper hand washing practice for meeting the objectives of WASH. Therefore, it is imperative to seek for underlying causes of not using soap despite a high level of knowledge of mothers about hand washing.

Practices of waste management, which are additional criteria for ODF,⁸ are even poor indicating that these aspects of environmental cleanliness may have received low priority in implementation since they do not fall in core or standard criteria of ODF. However, waste management is crucial component of WASH programme for achieving its overall goal.

Results of the study that WASH status was significantly associated with knowledge and not with economic condition explains that WASH can be improved even in low economic condition, if effective interventions are done to improve knowledge about WASH. This finding

may have important strategic implication in improving WASH situation in the community.

Although contribution of other factors to decrease diarrhoeal disease in the study area, found in the study, cannot be excluded, it can be logically argued that such reduction is primarily attributable to the improvement of WASH in the study area after ODF declaration since diarrhoeal diseases are primarily water-borne. Such attribute of improvement of WASH to reduce diarrheal diseases has been well established by WHO through observation in many countries.^{10, 11}

This study has revealed some important results, which have academic, policy and programmatic implications. One time declaration of ODF is encouraging for the community, however not sufficient for achieving its goal to improve health. Follow up and monitoring its status to sustain it and planning for further improvement are vital, as only positive change in knowledge, behavior along with structural improvement of WASH can contribute to promote health of people through WASH interventions.

CONCLUSIONS

WASH status in the study area is lower than the criteria for ODF declaration. However, diarrhoeal disease trend of under five children is found decreasing over the last two years after the declaration of ODF. The WASH related knowledge among mothers is significantly associated with WASH status of households irrespective of their economic status.

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