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PEOPLE'S PERCEPTION AND BEHAVIOUR TOWARDS REUSE OF WASTEWATER IN DHULIKHEL, NEPAL

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Abstract

Wastewater may be chemically polluted and / or biologically contaminated. Haphazard disposal of untreated from households as well as institutions and industry is causing severe deterioration of water bodies in many urban areas in the developing world. Most cities do not have adequate systems for the collection and treatment of and this is usually not considered to be a priority for investment. Wastewater treatment and its proper utilization is one of the main targets of the latest context. The main objective of the study was to assess the perception and behavior of the farmer towards use of treated water, in their farmlands, from the Dhulikhel Hospital wastewater treatment plant. This was a cross sectional descriptive study. The people residing on the peripheral site of the treatment plant were purposively taken as the sample population. Considering the confounding and allowable error, the sample size was calculated by using the formula $n = Z^2PQ/E^2$. In order to gather the information, semi-structured questionnaire was used to interview the total 107 respondents. The collected data were coded and entered in EPI-Info, edited in excel and analyzed in SPSS software version 16. Three villages (Chaukot, Kharpur and Vendole) of the Dhulikhel Municipality were selected purposively for the study. Among 107 respondents, 47.6% were from the Chaukot, 35.50% from Kharpur and 16.80% from Vendole. The mean age of the respondents was 44 years. Among the respondent 27% were literate and 73% illiterate. Most of the respondents were Hindu. Along with the water from the treatment plant other sources such as supply line (92.5%), ponds (6.5%) were used by the respondents and remaining 1% purchases it. People's perception regarding the reuse of water was not found satisfactory as they consider that the water from treatment plant was detrimental to health and also believe that it decreases the agricultural production. Skin disease and typhoid fever were the most prevalent water related problem faced by the respondents.

Key Words: Behaviour, Perception, Reuse, Treatment Plant, Wastewater

Introduction

Water reuse is also reflected to as the water reuse, water reclamation, and water cycling and wastewater reclamation in different part of the world. However, wastewater reuse as used has specifically referred to the utilization treated or untreated effluent which is conveyed to the specific location for utilization. Most of the term refers to deliberately planned process of treating and utilizing sewage effluent (WHO/UNEP, 2001).

Haphazard disposal of untreated from households as well as institutions and industry is causing severe deterioration of water bodies in many urban areas in the developing world. Most cities do not have adequate systems for the collection and treatment of and this is usually not considered to be a priority for investment. It is estimated that in developing countries, 300 million urban residents, 34% of them in South Asia, have no access to sanitation (Shrestha and Maharjan, 2009). Approximately two-thirds of the population in the developing world has no hygienic means of disposing of excreta and an even greater number lack adequate means of disposing of. This is a major public health risk as it can lead to outbreaks of diseases such as diarrhoea, cholera, and typhoid (Water Aid, 2008). Waste water is widespread but poorly documented in Nepal. Different type's benefits like agricultural irrigation, industrial uses, automobile etc. are of wastewater treatment plant in Nepal (Bhandari, 2014).

Wastewater treatment and its proper utilization is one of the major issues of the latest context. It has been documented that people feel hesitance in reuse of treated wastewater. It is essential to understand the perception of people towards wastewater reuse in Nepalese context. Hence this study aims to explore the perception and behaviour of farmers residing at periphery of wastewater treatment plant in this regard.

Material and methods

This was the cross sectional descriptive study which employed quantitative method. Farmer population residing in the periphery of the Dhulikhel treatment plant was considered as the study population. Purposive sampling technique was used to select the households. The sample size was calculated by using the formula

$n= Z^2 PQ/E^2$,

Where, n= required sample size.

Z=the standard normal deviate which was set at 1.96 that corresponds 95% of the confidence level.

Population proportion (P) = 0.5

Q = 1-P = 0.5

Allowable error (E) was set at 10 % (0.10)

Therefore, the estimated sample size was 96, considering 10% loss to interview and incomplete data during interview process; the ultimate sample size was 107.

Altogether 107 Farmers from the selected households were interviewed using semi structured questionnaire. Data was entered in EPI info, edited in Excel. SPSS version 16 was used to analyze the data. All the questionnaires were translated into Nepali before interview

process and were pretested in the similar setting of Kathmandu. Following the pre test, the necessary corrections were made.

Results and discussion

A total of 107 respondents were interviewed from three villages of Dulikhel. Among the respondents, 47.6% respondents were selected from Chaukot, 16.8% from Vendole and 35.5% from Kharpur villages of Kavre district. Out of total respondents, 65.3% were male and 34.7% female. Mean age of the respondent was 44 years with range varying from 29 to 62 years. Almost three quarter of the respondent was illiterate. Maximum respondent i.e. 93.5 % are Hindus and remaining 6.5 % are Buddhist.

All the respondents use the water from treatment plant only for irrigation. As the water from the treatment plant was not sufficient for the irrigation, 88.9% of the respondents used other sources as well. As the alternative source 92.5% respondents use supply line, 6.5% ponds and remaining 1% purchase the same. Maximum the respondent uses the water of treatment plant, for the purpose of agricultural irrigation by all of them which is similar to the study done in Egypt (US EPA, 2004) and Australia (Dolnicar et al., 2011). Treated water is not sufficient so they use alternative source of water which is similar to the study done in Egypt (Table 1).

Ninety five percent people faced the problem by using the treated water. Among them, 95.1 % had faced skin disease and remaining 4.9 % had typhoid fever. Akin to the study done by Nikolaus (2010) and Bhandari (2014) this study result also depict that maximum people face the risk of typhoid fever and skin infection. Likewise similar study shows public perceptions and acceptance of water reuse were recognized as the main ingredient of success of any reuse project (Murni et al., 2003; Adewani et al., 2008). In a study from Australia it was considered that the water was less risky from public health viewpoint. Educations of individual, age, sex, income gender were identified as perceived factors (Jasem and David, 2010) (Table 1).

All 107 household did not treat the water from treatment plant further. People's perception regarding the reuse of water was not found satisfactory as they consider that the water from treatment plant was detrimental to health and also believe that it decreases the agricultural production. They felt that the paddy production is hampered due to the use of this water. It created difficulty for the dwellers due to the bad odour and filthy area of the treatment plant.

Eighty percent people did not advice other farmers to use it in their farms. They gave reasons such as quality of water unsuitable for agriculture which leads to decrease in agricultural yield specially paddy production and skin problems like itching in foot, fungal infection etc. Around 37% responded that the water is not good for health, 13.9% said it leads to production decrease and 22.1 % pointed towards risk of skin diseases. Nearly 27% of the respondents did not give any reasons. (Table 2)

Whilst 11.2% respondents perceive some benefits of the treatment plant 88.8% did not pointed any benefits. Among the respondents who observe some benefit, 25% each assumed that the treatment plant was beneficial in controlling spread of various diseases and community waste management. Almost 33% thought that it helped in strategic management of hospital waste.

Remaining others (16.67%) assumed that such type of treatment plant could improve environmental sanitation in the community. Similar study result was observed in the report of UNEP (2010). In addition agricultural irrigation, industrial use and automobile cleaning were some benefits observed in the study by Bhandari (2014). (Table 3)

Table 1: Behaviour related information

Water sufficiency	Frequency	Percent
Yes	12	11.2
No	95	88.8
Additional source of water		
Supply line	99	92.5
Purchase	1	1
Ponds	7	6.5
Problem faced by the use of water		
No	4	3.7
Yes	103	96.3
Types of problem		
Skin disease	98	95.1
Typhoid	5	4.9
Total	107	100.0

Table 2: Perception related information

Advice given to use treated water	Frequency	Percent
Yes	21	19.6
No	92	80.4
Total	107	100.0
Reasons for not advising for use of treated water		
Bad for health	32	37.2
Decrease in agricultural yield	12	13.9
Risk of skin disease	19	22.1
Do not know	23	26.7
Total	86	100

Table 3: Benefits of using treated water

Perceived benefit	Frequency	Percent
Yes	12	11.2
No	95	88.8
Total	107	100
Perceived Benefits of using treated water		
Control of spread of diseases	3	25
Hospital management	4	33.3
Community management	3	25
Improved environmental sanitation	2	16.7
Total	12	100

Conclusion

People perception plays an important role towards the using the treated water. Perception and behaviour are inter-related to each other. Treated water was totally used for irrigation purpose and somehow helped to fulfil the water related demand. However alternative sources were also used to overcome the scarcity. Health and productivity related problems were the most confronted problem faced by the users. However some respondents perceived few benefits like control of spread of disease, hospital and community waste management and improved environmental sanitation.

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