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Research Article



Spatial Distribution of Municipal Water from Pangri, (MS) India

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Abstract

Water is considered as most important natural resource than other natural resources. Before supplying water to public the examination is done to reduce the bacterial contamination. The water supply in Pangri village is by Municipal. Samples were collected to study the bacterial contamination. The most probable test technique was used for identification of quantity of *Escherichia coli*. Total Five tap water samples were collected during August, 2015 to July, 2016. The water samples were collected in well cleaned sterile bottles. There should be no any other contamination so that precaution was taken during sample gathering. These samples were brought immediately to the laboratories for further analysis. The coliform concentration varies from 11 to above 430 MPN/100 ml. All water samples are above permissible limit prescribed by WHO standards. To show the spatial distribution of municipal water Arc GIS software was used.

INTRODUCTION

In India nowadays there is increase in contamination of water because of pollution. The pipe line connections done underground by municipal are getting damaged so that linkages are causing contamination to well treated drinking water. Due to pathogenic microorganisms like *E. coli* there is cause of diseases so it is more important to identify the bacterial contamination from water. For human population pure water is required for drinking purpose which should be free from bacterial contamination (Talat *et al.*, 2015).

To maintain human health water plays an important role also having right of consuming fresh water. There are many modern techniques which are used for disinfection of water (Shahaby *et al.*, 2015).

The total availability of fresh water on earth is 0.3 to 0.5 percent. Groundwater, surface water atmospheric water and springs are the source of

available water for peoples. The quality of fresh water depends upon the environmental factors in specific location (Shukla *et al.*, 2017).

Assessment of pure water for drinking purpose is fundamental right of humans. Throughout globe about 1.1 billion people are inaccessible to safe drinking water. Rapid growing population and their demands in developing countries are the reasons for water pollution. Government cannot provide necessary infrastructure for waste water management and supply (Tekpor *et al.*, 2017).

Water exists life of all living organisms present on earth for healthy life. Due to bacterial contamination there are major deaths in developing countries. Surface water and groundwater are source of drinking water the fecal contamination causes due to the transfer of contaminated water in fresh water bodies (Kanth *et al.*, 2018).

MATERIALS AND METHODS

The water samples were collected from the free water dispensers from higher education institutions. To define bacterial contamination from selected samples multiple tube fermentation method was used. During research found that there was major contamination of coliform bacteria in Mahidol University, Salaya Campus, Thailand (Pratum and Khananthai, 2017).

For analysis of bacterial contamination total 20 water samples were collected then the most regular method multiple tube fermentation method was used to determine the coliform contamination. They found that 17 samples were unsatisfactory and 3 samples were satisfactory (Malathy *et al.*, 2017).

The area of Pangri village is about 547 hectares comes under Nanded tehsil Maharashtra. It is more near to Swami Ramanand Teerth University Nanded and Vishnupuri. In Pangri village there are 226 houses having population about 1261. People use tap water as source for drinking purpose.

Total five Municipal water samples were collected from Pangri village on monthly basis for one year. Samples were immediately brought in laboratory for analysis. The MPN test is carried out for investigation of coliform contamination. Presumptive, Confirmative and Completed test was carried out. The water samples were collected for investigation of coliform concentration. Experimental procedure was carried carefully and precaution was taken to avoid other contamination. MacConkey broth with water dilution 10:10, 5:1 and 5:0.1 is distributed in test tubes and kept for incubation. In confirmative test EMB broth is used for *coliform* growth. At last in Completed test BGLB is used to confirm obtained positive test tubes. Analysis method is used from environmental practical methods given by Trivedi and Goel (Trivedi and Goel, 1998).

RESULT AND DISCUSSION

In Pangri tap water is used as source of drinking water. Drainage and septic tanks are near to tap water connections and having linkages are the reason for *coliform* contamination. Small children do latrine near to drainage and tap water

connections. Municipal water is supplied to public to consume as drinking water. According to standard limit prescribed by WHO there should be 6 to 10 MPN/100 ml in potable water. After investigating by MPN test *coliform* were found above permissible limit. The positive obtained test tubes resulted on the basis of Standard Methods for the Examination of Water and Wastewater, 20th edition American Public Health Association, New York (Standard Methods, 1998). The MPN/100 ml ranges from 11 to 430. Minimum MPN/100 ml is 11, maximum is 430 and average ranges from 49.416 to 87.083 (Table 1) and tap water samples are distributed in three different classes (Table 2). Graphical representation shows the monthly variations of *E. Coli* (figure 1–5). The average, minimum and maximum variation is shown in (figure 6).

The study on bacterial analysis of drinking water by MPN method in tertiary care hospital and adjoining area western UP, India was done. The samples were collected from municipal tap water, government hand pumps and water cooler. *Coliform* concentration had shown its 50 percent presence in municipal water samples (Kumar *et al.*, 2013).

The samples were collected for investigating bacterial contamination of drinking water supplies in a modern rural Neighborhood and found that water used in households is contaminated by *coliform* (Lamka *et al.*, 1980). The study reveals that Microbial analysis of sachet and tap water in Enugus state on Nigeria was found that coliform is 500 MPN/100 ml (Ohanu *et al.*, 2012).

After evaluation of *coliform* it is found that all results are above permissible limit prescribed by WHO. The Municipal water samples 1, 3 and 4 has shown there higher concentration of coliform. By using Arc GIS software the spatial distribution of municipal water is shown in (figure 7 – 18). Through spatial distribution method you can analyze easily high and low concentration of *E. Coli* from selected sampling locations from Pangri area. To avoid such microbial contamination easy method is to boil water at 100°C or follow the chlorination process.

Table 1: Showing the MPN/100 ml during August, 2015 to July, 2016

Month	TW-1	TW-2	TW-3	TW-4	TW-5
Aug	81	69	69	81	36
Sep	72	69	81	64	32
Oct	69	69	81	72	40
Nov	350	81	70	45	430
Dec	95	70	46	110	250
Jan	12	25	17	14	32
Feb	11	12	24	13	17
Mar	32	28	23	32	45
Apr	32	22	22	24	17
May	25	25	28	16	17
Jun	28	35	45	41	48
Jul	180	180	430	81	81
Min	11	12	17	13	17
Max	350	180	430	110	430
Ave	82.25	57.08333	78	49.41667	87.08333

Note: TW = Tap Water provided by municipal

Table 2: Tap water quality classification

Water Class	Permissible Limit (WHO) MPN/100	No. of Samples
Potable	0-5	-
Moderate	6-10	-
Non-Potable	10 Above	5

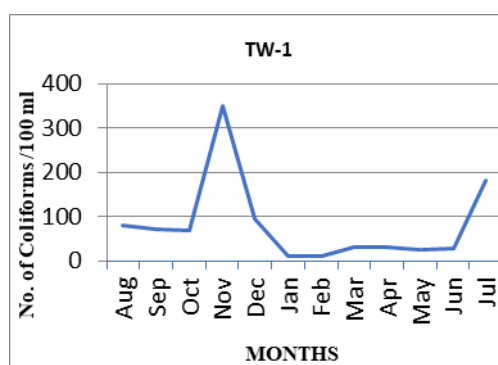


Figure 1: Graphical representation of MPN/100ml of TW-1.

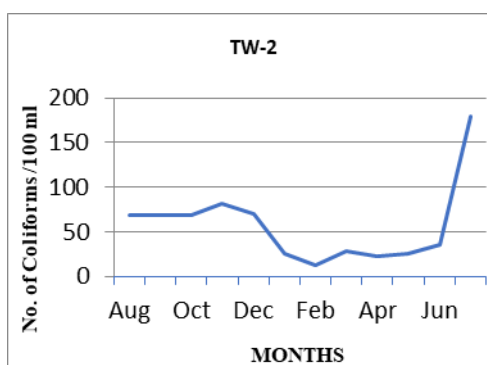


Figure 2: Graphical representation of MPN/ 100 ml of TW-2

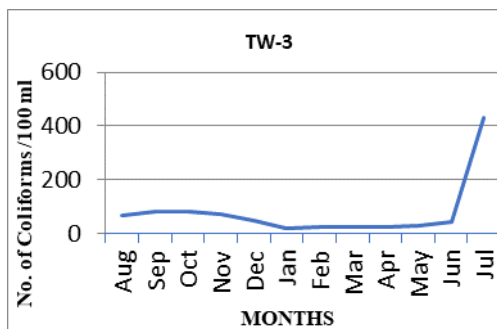


Figure 3: Graphical representation of MPN/100ml of TW-3.

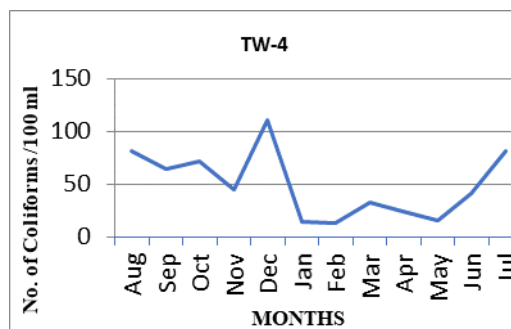


Figure 4: Graphical representation of MPN/ 100 ml of TW-4

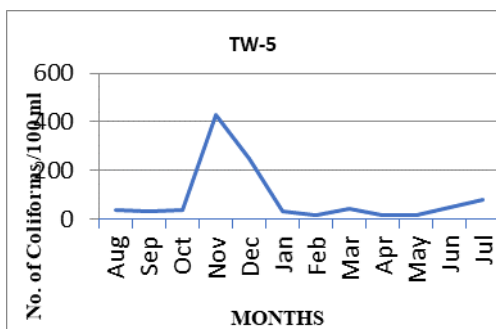


Figure 5: Graphical representation of MPN/100ml of TW-5.



Figure 6: Graphical representation of MPN/100ml showing Minimum, Maximum and Average values.

Spatial Distribution of MPN/100 ml from August, 2015 to July, 2016

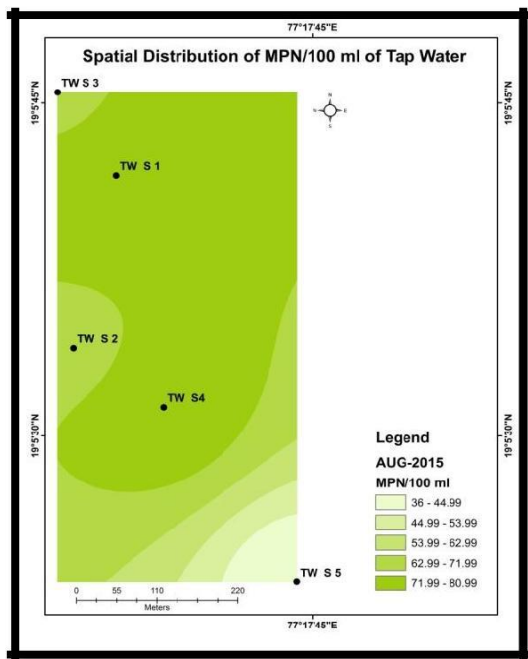


Figure 7

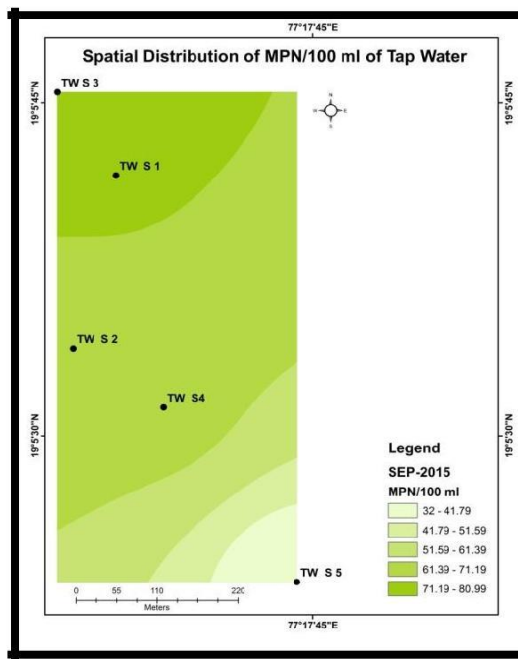


Figure 8

Figure 7 & 8: Showing the spatial distribution of MPN/100 ml of August, 2015 and September, 2015

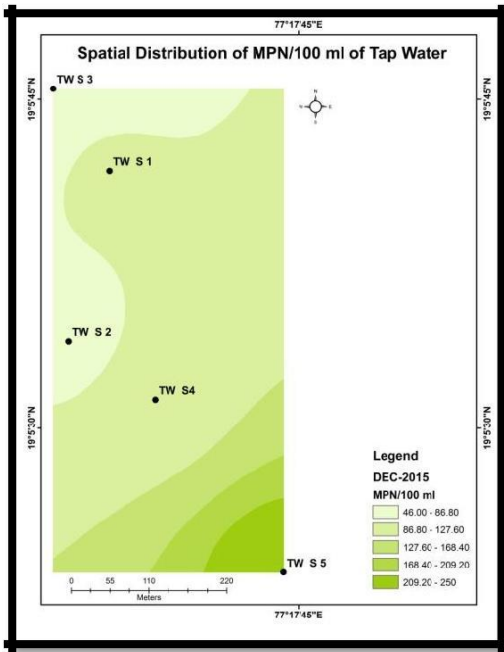


Figure 9

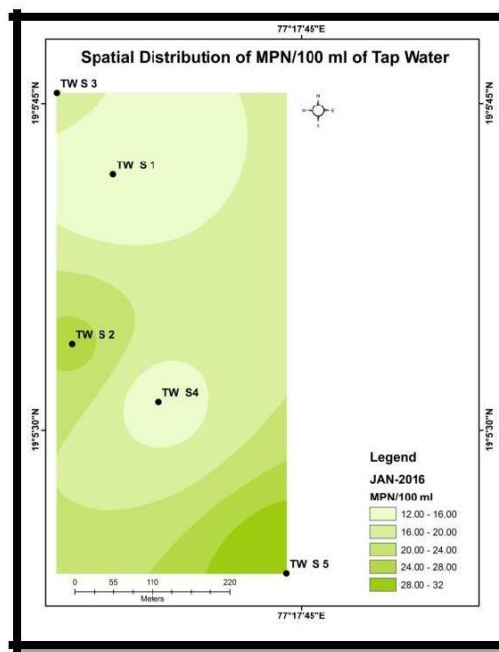


Figure 10

Figure 9 & 10: Showing the spatial distribution of MPN/100 ml of October, 2015 and November, 2015

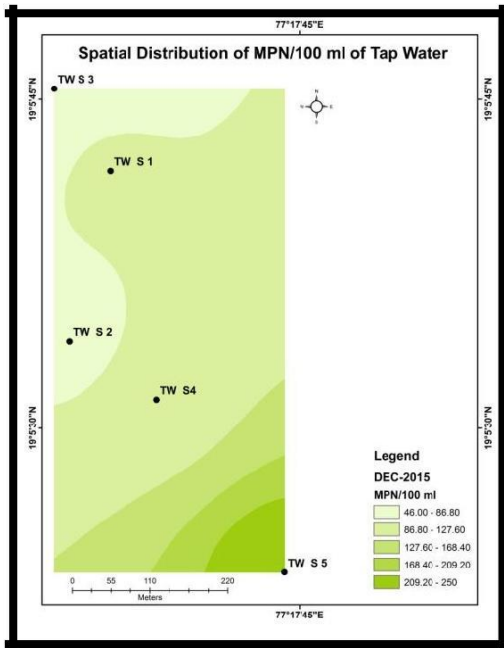


Figure 11

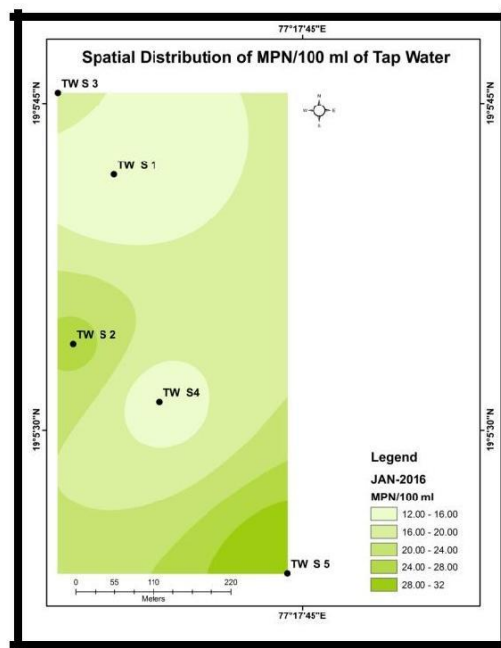


Figure 12

Figure 11 & 12: Showing the spatial distribution of MPN/100 ml of December, 2015 and January, 2016

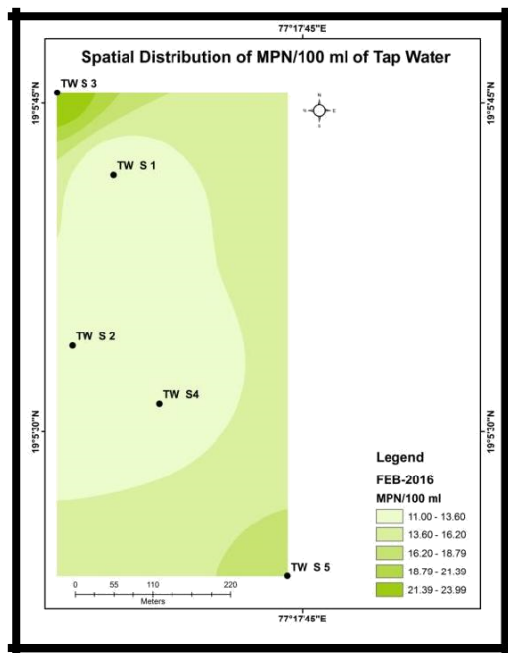


Figure 13

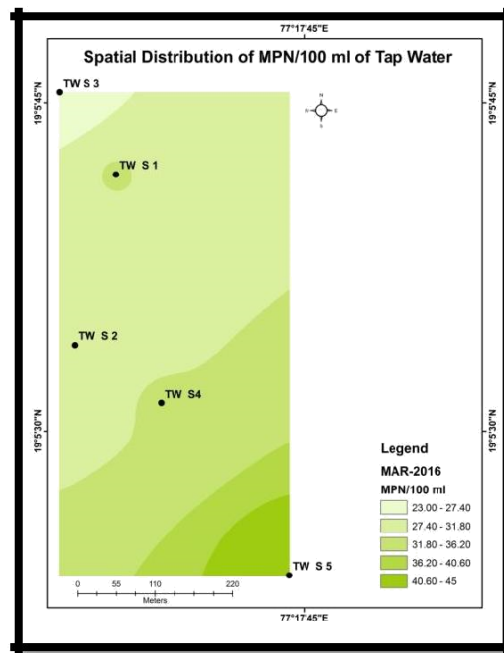


Figure 14

Figure 13 & 14: Showing the spatial distribution of MPN/100 ml of February, 2016 and March, 2016

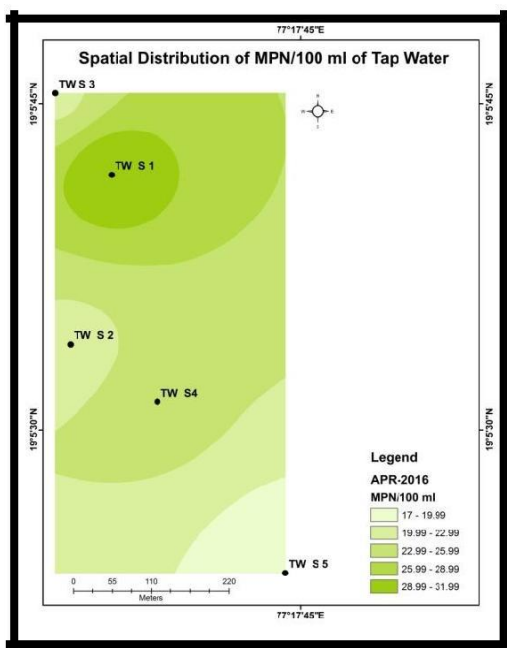


Figure 15

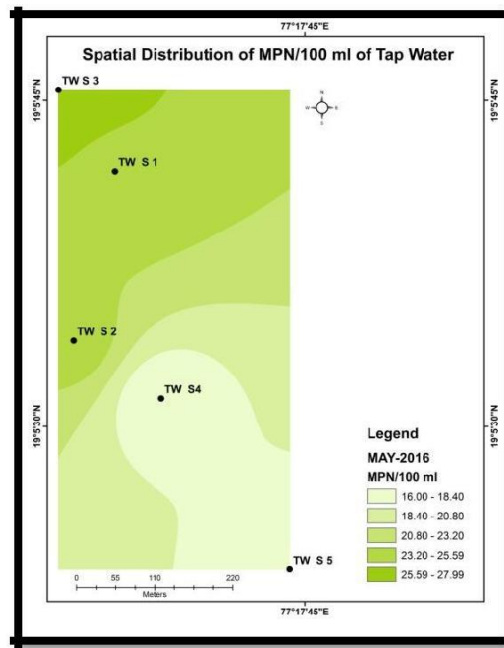


Figure 16

Figure 15 & 16: Showing the spatial distribution of MPN/100 ml of April, 2016 and May, 2016

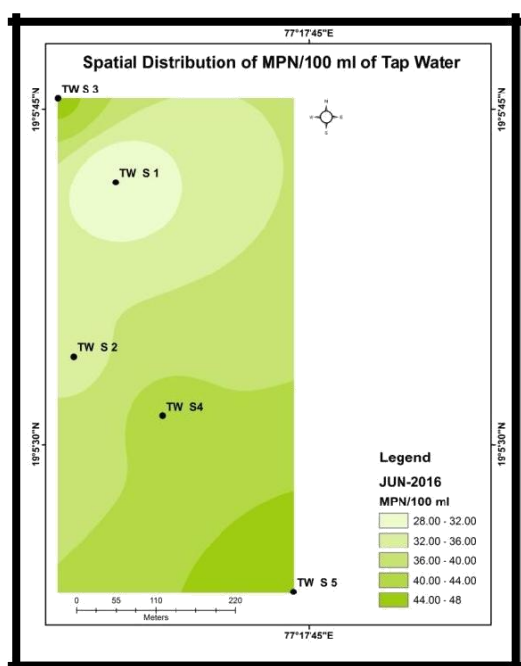


Figure 17

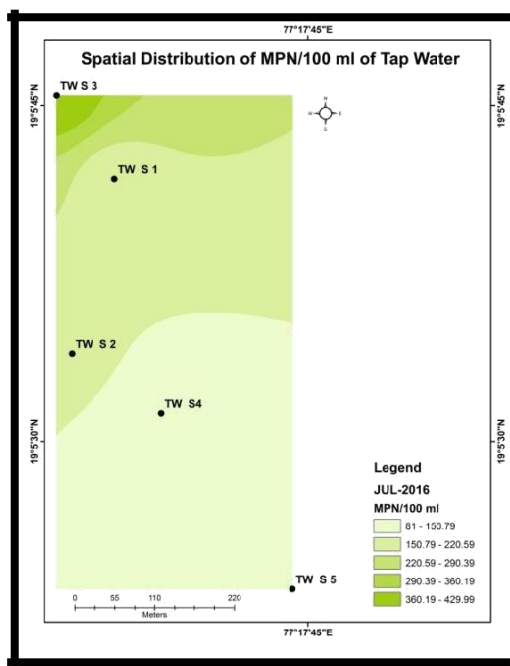


Figure 18

Figure 17 & 18: Showing the spatial distribution of MPN/100 ml of June, 2016 and July, 2016

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REFERENCES

- Kanth MK, Singh SK, Kashyap A, Gupta VK, Shalini S, Kumari S, Kumari R and Kumari P, 2018.** Bacteriological assessment of drinking water supplied inside the government schools of Patna District, Bihar, India. *American Journal of Environmental Protection*, **6** (1): 10-13.
- Kumar D, Malik S, Molly M, Pandey A and Asthana AK, 2013.** Bacteriological Analysis of drinking water by MPN method in a Tertiary Care Hospital and Adjoining Area Western UP, India. *Journal of Environmental Science, Toxicology and Food Technology*, **4** (3): 17-22.
- Lamka KG, Lechevallier MW and Seidler RJ, 1980.** Bacterial Contamination of Drinking Water Supplies in a Modern Rural Neighborhood. *Applied and Environmental Microbiology*, **39** (4): 734-738.
- Malathy BR, Sajeev SK, Thampy S, Guruvayurappan K and Sweetlin AP, 2017.** Bacteriological Analysis of Drinking Water by MPN method from Chennai, India. *Journal of*

Environmental Science, Toxicology and Food Technology, **11** (7): 57-64.

Ohanu ME, Udoh IP and Eleazar CI, 2012. Microbiological analysis of Sachet and Tap Water in Enugu State of Nigeria. *Advances in Microbiology*, **2**: 547-551.

Pratum C and Khananthai, 2017. Assessment of factors affecting drinking water quality from free water dispensers in the higher education institute. *International Journal of Environmental and Science Education*, **12** (4): 787-797.

Shukla DP, Vaghela KB and Jain NK, 2017. Assessment of Physico-chemical and bacteriological Water Quality Parameters: A Review. *International Journal of Pharmacy and Integrated Life Sciences*, **5** (2): 1-17.

Shahaby AF, Alharthi AA and Tarras AE, 2015. Bacterial evaluation of tap water and bottled mineral water in Taif, Western Saudi Arabia. *International Journal of Microbiology and Applied Science*, **4** (12): 600-615.

Tekpor M, Akrong MO, Asmah MH, Banu RA and Ansa ED, 2017. Bacteriological quality of drinking water in the Atebubu-Amantin District of the Brong-Ahafo Region of Ghana. *Applied Water Science*, **7**: 2571-2576.

Talat Y M, Khaizran S, Rifat ZA, Syed AS, Syed TA and Wahab A, 2015. Bacteriological Quality Analysis of Tap Water of Karachi, Pakistan. *International Journal of Advanced Research*, **3** (2): 573-578.

Standard Methods, 1998. *Standard Methods for the Examination of Water and Wastewater*, 20th

edition, American Public Health Association, New York, Pp 1749-1751.

Trivedi RK and Goel PK, 1998. *Practical Methods in Ecology and Environmental Science*. Enviro Media Publication, Karad, Pp 1- 175.

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