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Assessment of Available Water and its Effect on Rural and Urban Community in Aurangabad District

Dr.Kalpana N.Deshmukh
HOD Dept of Home Science
V.P.S.P.M.s College of Art's, Commerce and Science
Kannad, Dist.Aurangabad

Abstract:

Water is second only to Oxygen to in its vital importance to the body. One can live without food for a longer time than one does without water. In Aurangabad district groundwater is generally used for drinking & other domestic purposes in rural and urban areas. Assurance of drinking water safety is a foundation for the prevention and control of water borne diseases to better health to living organism. The proposed study is to investigate the presence and concentration of some elements in borehole water, tap water & well water used for drinking and other domestic wastage in rural and urban areas in Aurangabad district. To ascertain whether the water is within the acceptable standards for human consumption as set by "Standard methods of Analysis of water and wastewater i.e. (APHA). From the study it is clear that water from urban regions of Aurangabad district is safe for drinking purpose than rural regions.

Key Words: Water, Rural, Urban, Aurangabad, Community

Introduction

'Water is life' Water is one of the five elements described in "Shastra" to life. It is a basic nutrient of the human body and is critical to human life. It occupies about 70% of earth's surface. The principle source of all water supplies is precipitation water runs along the surfaces as confined or unconfined flow or moves along the surface in broad sheets of water .Sub surface water include ground water and soil water. Ground water constitutes 97% of global fresh and many regions ground water sources are the single largest supply for serving drinking water to the

community (Bharti et.al.2011) .Ground water sources are a) Wells b) Springs c) in-filtration galleries

Borehole / Hand Pump Water

Usually, water from the boreholes may be free from danger pathogens for humans like cholera, typhoid, dysentery guinea worm and many others. Borehole water is groundwater available in an aquifer obtained by installing a pump to draw the water to the consumers. Any contaminated surface water with pathogen that infiltrates into the soil and become groundwater would be filtered by the soil profile before reaching the depth of aquifer. An aquifer is saturated water bearing stratum that is capable of holding, transmitting and yield sufficient water in underground to well. The major problem of boreholes is chemical content of the groundwater, which must be analyzed to ascertain if these dissolved products are within the permissible limits for consumption purpose by the authorities, in this case the world health organization WHO.

Tap Water:

In addition to H_2o water contains a number of substances. Even though chemicals are added to tap water to purify it for drinking and cooking in homes, there are still health risks. Chlorine is the most common of the types of chemicals urgently being used to treat public water supplies. It is used to remove and to kill any bacteria which could be living in the water. Over time chlorine taken in small doses will increase the risk of cancer, heart disease and other health conditions.

A brief list of the types of toxins in drinking water and how they affect on heath of people.

1. Chlorine: can cause bladder and rectal cancers, and also asthma recently, experts have linked chlorine to breast cancer.
2. Lead: Lead enters tap water through corroded pipes. Lead in drinking water is harmful for pregnant mother and children. Lead poisoning has been proven to cause learning disorder and severe developmental delays. (Heartland springs)

3. Giardia and Cryptosporidium:

These types of protozoa are responsible for widespread and severe outbreaks of gastro intestinal diseases. They will make their way in the water system whenever here has been a sanitation breakdown.

Well Water:

Waterborne diseases can be spread via a well which is contaminated with fecal pathogens from pit latrines most of the bacteria, viruses, parasites and fungi that contaminate well water comes from fecal material from humans and other animals. Common bacterial contaminants include E.coli, salmonella, shingella and Campylobacter jejuni. Chemical contamination is a common problem with ground water. Nitrates from sewage, sludge or fertilizer are a particular problem for babies and young children.

Review of Literature

Alla EI-Dinetal (1993) reported the quality of well water from six regions of the kingdom of Saudi Arabia with respect to physic-chemical and bacteriological parameters. Sixteen percent of the wells crossed the WHO limit for ammonia. Faecal coliform was present in 21.4% of the tested well waters. Animal and human wastes were the significant source of well water pollution. Water samples from deep tube wells of Hazaribagh, Aramnitola and Banani of Bangladesh were analyzed for 26 parameters to their suitability for drinking purpose as well as their possible contamination by Alangir *et al.,* (1994).

Pradhan *et al.,* (2003) investigated the quality of drinking water used by the communities and their awareness regarding water quality and water borne diseases in Bungamati Locality in Kathmandu Valley, Nepal. The observation indicated that the factors responsible for contaminating drinking water at source point included lack of protection and proper treatment of water, leakage in pipe distribution system, intermittent supply of water, poor drainage system and poor environment surrounding of water sources. So, the drinking water is not potable. The communities are unaware of the quality of water they use.

Study Objectives:

1. To assess the water quality of the present study area according to water quality parameters i.e. Chlorides, Fluorides, Total Hardness and total dissolved solids (TDS).
2. To assess and compare the Physico Chemical and Microbiological contamination of borehole/ Hand pump, well and tap water in rural and urban areas of Aurangabad district.
3. To study the suitability of groundwater for drinking i.e. portability of water from three different sources i.e. Tap, borehole / Hand pump and well water in rural & urban areas of Aurangabad district.
4. To study the impact of polluted water on the health of rural and urban population of Aurangabad, district.
5. To aware the rural and urban population about the hazardous effects of polluted water.
6. To ascertain whether the water available for drinking purpose in rural and urban areas is within the acceptable standard methods of analysis of water.

Research Hypotheses:

For this study the following hypotheses are generated:

1. There is significant difference between urban and rural area of living on health of people in terms of water quality parameter i.e. TDS, TH, Chloride, Fluoride
2. There is significant difference between sources of water on health of people in terms of water quality parameters i.e. TDS, TH, Chloride, Fluoride

Methodology

Research Design: The main purpose of the study was to assess the water quality & its effect on rural and urban community of Aurangabad district. For the present study 2x3 factorial research design was used.

Area of study: for the present investigation four talukas of Aurangabad district were selected namely Kannad, Khultabad, Phulambri and Aurangabad

Selection of sample: For the study 100 samples were selected from rural and urban areas of Aurangabad district out of these fifty samples were selected from rural and remaining fifty samples were selected from urban areas. Ground water samples were collected by grab sampling method from hand pumps or bore wells, open wells and taps (treated water) All the samples have been analyzed in the laboratory of Government of Maharashtra, water Resource Dept Lab and Manas Enterprises, soil and water testing laboratory. Aurangabad.

Data Collection

For the proposed study to collect primary data a socioeconomic survey was undertaken by the investigator with the help of questionnaire and to analyze the water quality parameters "Standard Methods of Analysis of Water & Wastewater''(APHA) was followed. Water quality assessment involves analysis of physiochemical, biological and microbiological parameters

Research Variables

For the present study independent and dependent variables are used

1. Independent Variables:

i) Water quality Parameters like TDS, TH, Chloride and Fluoride

ii) Area of Living i.e. Rural and Urban well and tap water (treated)

iii) Source of water i.e. bore hole / Hand pump, open

2. Dependent Variable: Health of people belonging to rural and urban community

Statistical Analysis:

For the present study data was analyzed using SPSS version 20th software (statistical package for social sciences). The descriptive statistics such as percentage and mean were determined.

Difference between each of categorical variable with health of people was assessed with standard deviation and strength was computed by odds ratio (OR) with 95% CI confidence Interval. Variables showing statistically significant difference with the outcome variables (p 0.05) were considered as potential risk factors for health of people analysis of variance ('t' test and 'f' test) was applied for further statistics.

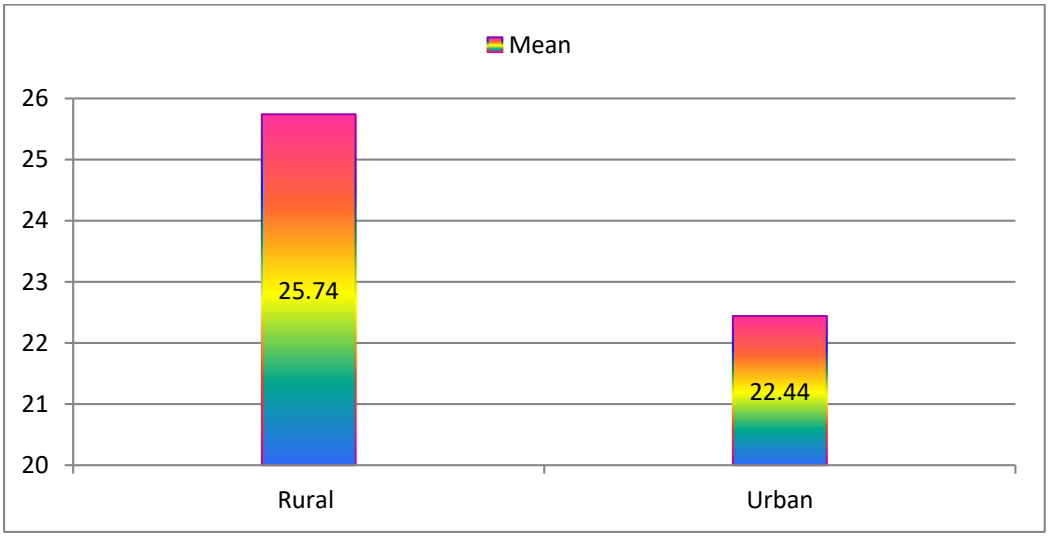
Result & Discussion

The present study was undertaken to assess the available water and its effect on rural and urban population of Aurangabad district. The study was conducted in different areas of Aurangabad district including rural as well as urban area. Results were presented in graphs to get numerical as well as visual idea for easy and better understanding.

There is significant difference between urban and rural area of living on health of people in terms of water quality parameters i.e. TDS

Graph No. 4.1

Showing Mean & S.D. Values for Urban and Rural area of living on health of people in terms of water quality parameters

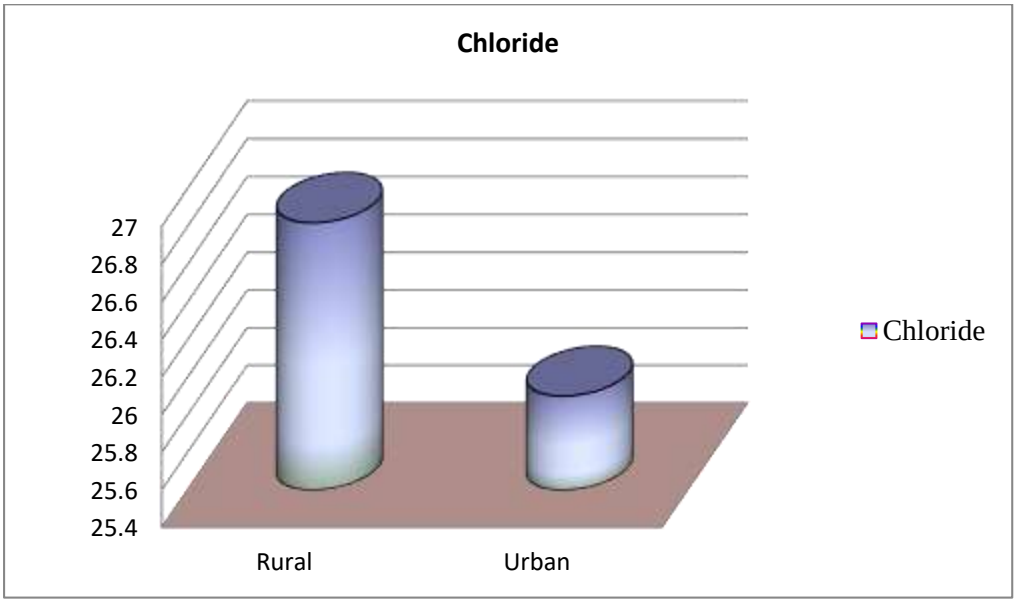


Graph no. 4.1 Showing that the mean score (25.74) of the rural area of living is found higher than mean score (22.44) of the urban area of living on health of people in terms of water quality parameters i.e. TDS, further inferential statistics. i.e. Analysis of Variance one way ANOVA **($t_{(df=299)} = 3.86, p < 0.01$)** shows significant difference between urban and rural area of living on health of people in terms of water quality parameters i.e. TDS, thus, it is concluded that contamination of water highly affects on health of people to rural area than urban area of living due to the presence of TDS.

There is significant difference between urban and rural area of living on health of people in terms of water quality parameters i.e. Chloride.

Graph No. 4.2

Showing mean & S.D. values of urban and rural area of living on health of people in terms of water quality parameters ie. Chloride.

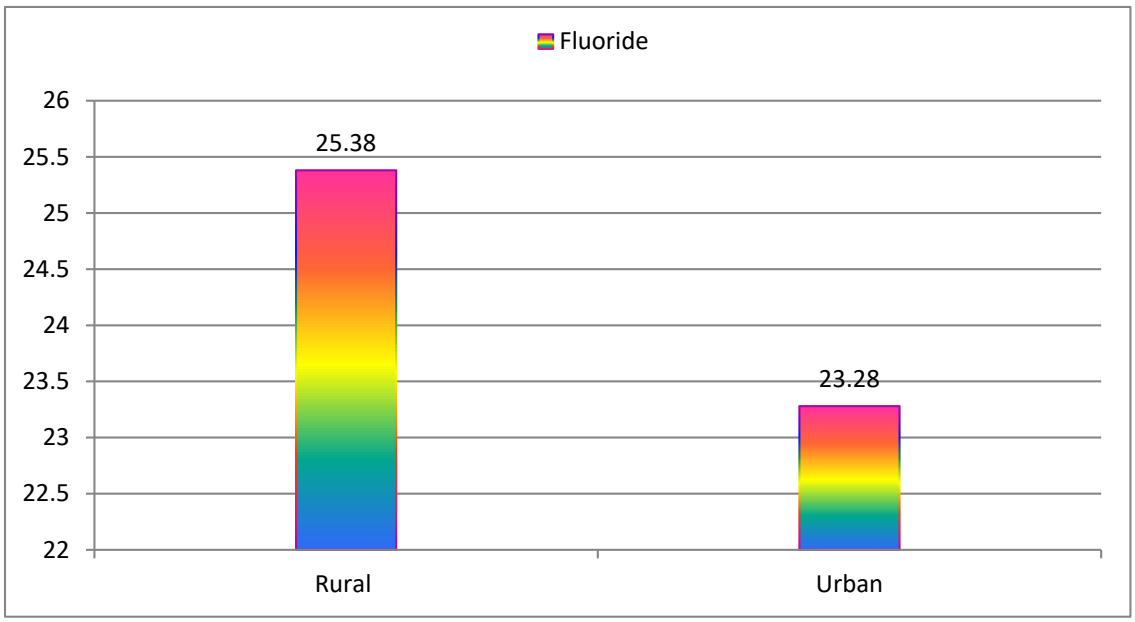


Graph no. 4.2 showing that the mean score (26.82) of rural area is higher than the mean score (25.09) of urban area of living on health of people in terms of water quality parameters i.e. chloride, further inferential statistics i.e. analysis of variance one way ANOVA **($t_{(df=299)} = 2.33, p < 0.05$)** indicate that there is significant difference between urban and rural area of living on health of people in terms of water quality parameter ie. Chloride. Thus, it is concluded that

contamination of water due to presence of chloride above desirable limit can be highly affects on health of people in rural area than urban areas of living.

There is significant difference between urban and rural area of living on health of people in terms of water quality Parameters i.e. fluoride.

Graph 4.3
Showing Mean and S. D. values for urban and rural area of living on health of people in terms of water quality parameters i.e. fluoride.

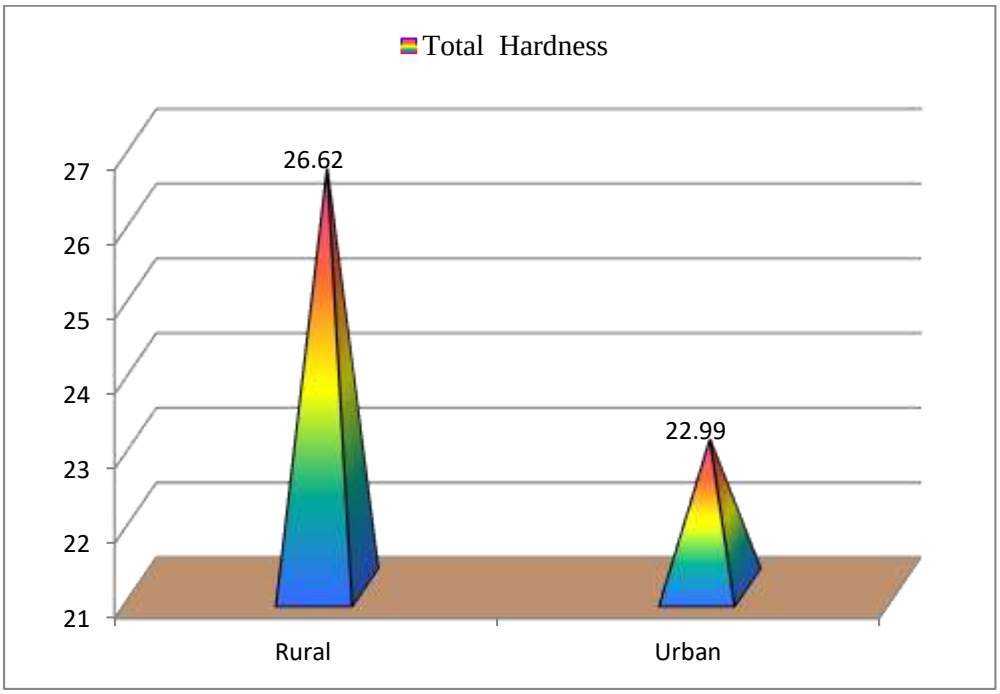


Graph No. 4.3 indicating that the mean score 25.38 of rural area of living is higher than mean score (23.38) of urban area of living on health of people in terms of water quality parameters i.e. Analysis of variance one way (ANOVA) **($t_{(df=299)} = 2.79, p < 0.01$)** shows that there is significant difference between urban and rural area of living on health of people in terms of water quality parameter i.e. fluoride. Thus, it is concluded that presence of fluoride in drinking water above and below the permissible limit can be highly affects on health of people in rural area than urban area of living.

There is significant difference between urban and rural area of living on health of people in terms of water quality parameters i.e. Total Hardness.

Graph No. 4.4

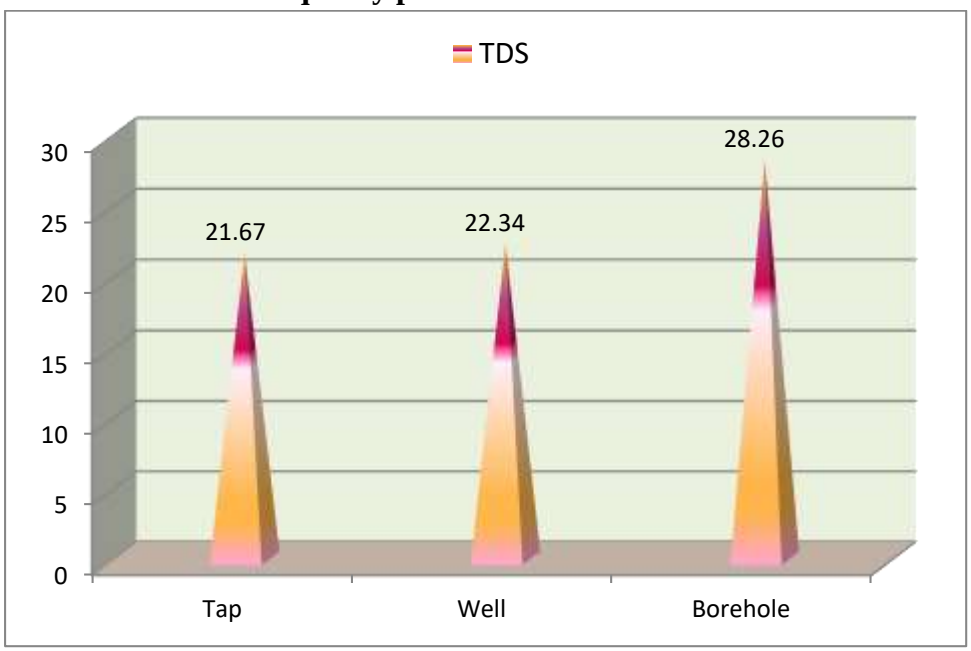
Showing Mean and S.D. values for urban and rural area of living on health of people in terms of water quality parameters i.e. Total Hardness.



Graph no. 4.4 showing the mean score (25.62) of rural area of living is higher than mean score (22.99) of urban area of living on health of people in terms of water quality parameters i.e. analysis of variance one way (ANOVA) **($t_{(df=299)} = 3, p < 0.01$)** shows that there is significant difference between rural and urban area of living on health of people in terms of water quality parameter i.e. Total Hardness. Thus, it is concluded that contamination of water due to presence of Total Hardness above desirable limits can be highly affects on health of people in rural area than urban area of living.

There is significant difference between sources of water on health of people in terms of water quality parameters i.e. TDS.

Graph 4.5
Showing Mean and S.D. values for sources of water on health of people in terms of water quality parameters i.e. TDS.

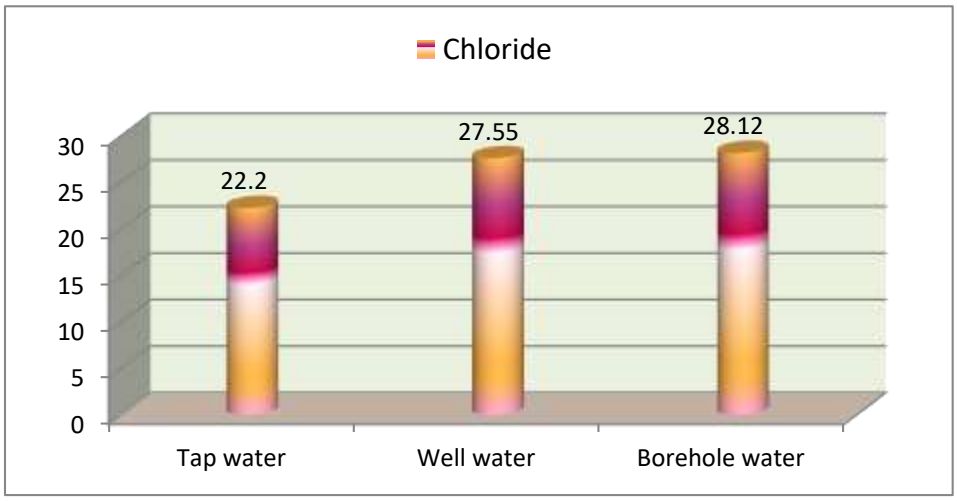


Graph no. 4.11 showing that the mean score (25.74) of Borehole water is found higher than mean score of Well (22.34) and Tap water (21.67) on health of people in terms of water quality parameters i.e. TDS. One way analysis of variance (ANOVA) indicates by table no. 4.15 **($F_{(df=299)}$=26.97 P<0.01)** it shows the significance difference were found between sources of water on health of people in terms of water quality parameters i.e. TDS Thus, it is concluded that TDS concentration in Borehole water and well water highly affect on health of people than Tap Water.

There is significant difference between sources of water on health of people in terms of water quality parameters i.e. Chloride.

Graph no. 4.6

Showing Mean and S.D. Values for sources of water on health of people in terms of water quality parameters i.e. Chloride.

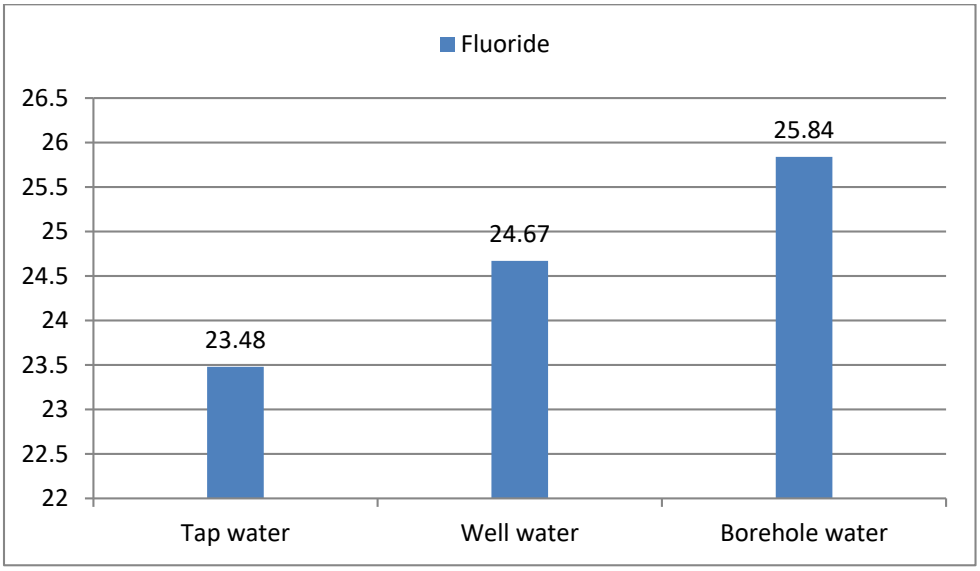


Graph No. 4.12 showing that the mean score (28.12) of bore hole water is found higher than mean score of Well (27.55) and tap water (22.20) on health of people in terms of water qulity parameters i.e. Chloride. One way analysis of variance indicates by table no. 4.4 **(F $_{(df=299)}$ =30.62, P<0.01)** it shows that significant difference were found between sources of water on health of people in terms of water quality parameters i.e. Chloride. Thus, it is concluded that Chloride contamination in Bore hole water and Well water highly affects on health of people than Tap water.

There is significant difference between sources of water on health of people in terms of water quality parameters i.e. Fluoride.

Graph No.4.7

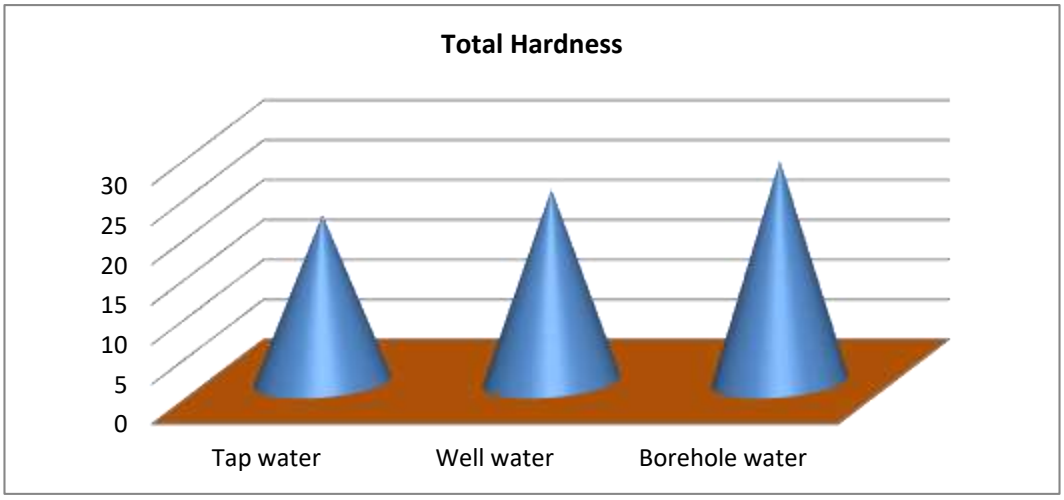
Showing Mean and S.D. Values of sources of water on health of people in terms of water quality parameters i.e. Chloride.



Graph no. 4.13 showing that the mean score (25.84) of Bore hole water is found higher than mean score of Well (24.67) and Tap water (23.48) on health of people in terms of water quality parameters i.e. Fluoride. One way analysis of variance indicates by table no. 4.17 **(F $_{(df=299)}$ =4.05 P. < 0.05)** it shows that significant difference were found between sources of water on health of people in terms of water quality parameters i.e. Fluoride. Thus, it is concluded that Fluoride contamination in Bore hole water and Well water highly affects on health of people than Tap water.

There is significant difference between sources of water on health of people in terms of water quality parameters i.e. Total Hardness.

Graph no. 4.7
Showing Mean and S.D. values for sources of water on health of people in terms of water quality parameters i.e. total hardness.



Graph no. 4.14 showing that the mean score (27.82) of bore hole water is found higher than mean score of well (24.16) and tap water (20.94) on health of people in terms of water quality parameters i.e. Total hardness. One way analysis of variance indicates by table no. 4.18 **('F' $_{(df = 299)}$= 23.02. P <0.01)** it shows that significant difference were found between sources of water on health of people in terms of water quality parameters i.e. TH. Thus, it is concluded that total hardness contamination in Bore hole water and Well water highly affect on health of people than Tap water.

Conclusions:

To assess the available water quality and its effect on rural and urban population of Aurangabad district. The study was carried out in different steps and specific conclusions are drawn based on findings

- The level of water quality parameter i.e. TDS found different in rural and urban area of living and it affects health of people.
- In the study the level of water quality parameter chloride found different in rural and urban area Hence water contamination due to presence of chloride above desirable limit can be highly affects on health of people.
- The level of water quality parameter i.e. fluoride found different in rural and urban area and it affects on health of people.
- The study shows the level of Total Hardness found different in rural and urban area of living and TH above desirable limit can be highly affects on health of people. Waters with hardness greater than 300 mg/l may lead to heart and kidney problems.
- The level of calcium found different in both of the area of living i. e. rural and urban area. The concentration of calcium above permissible limit can highly affects on health of residents. If the excess of calcium, it can cause depression of the function of muscles and nervous tissues.
- The level of TDS in tap water, well water and borehole water found different and it affects on health of people. From study it concluded that TDS concentration in Borehole water and well water highly affect on health of people than tap water.
- The level of chloride concentration of well and borehole found higher than tap water and it affects on health of people.
- The level of fluoride in tap water well water and borehole water found different and it affects on health of people.
- The total Hardness contamination in borehole water and well water highly affect on
- health of people than tap water.

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