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Appraisal of Different Water Qualities: A Case Study of Sachet and Bottled Water in Gbaramatu Kingdom

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ABSTRACT: *The need to appraise the qualities of the different waters supplied in Gbaramatu Kingdom emanated because of the issues of bad waters that cause diseases. Based on this need, the appraisal of different water qualities via the collation of three water samples that it is being supplied regularly. The samples of water were collated from the Gbaramatu Kingdom - Kurutie Community via water distribution agents. The water samples collated include two bottled water and one sachet water, which is also known as 'pure water'. The samples were labeled A, B and C respectively. Sample A is bottled water and Sample B is different bottled water, while Sample C is sachet water. Samples A and B are bottled waters with different company names. The different samples were kept in a cool flask of about 250ml of ice, and then they were conveyed to Petroleum Training (PTI), Effurun, Delta State, Nigeria - Water Test Laboratory for physical, chemical together with biological investigations. The investigation included pH, turbidity, color, odor, total dissolved solids, conductivity, total alkalinity, chloride, total hardness, sulphate, nitrate, total iron, lead and coliform count respectively, and the results were taken and recorded. The results obtained show that all the three samples, A, B and C, meet the WHO standard and therefore the water is good for drinking and domestic usage. It is recommended that this test should be conducted repeatedly.*

Keywords: Appraisal, Different Water, Quality, Sachet Water, Bottled Water

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I. INTRODUCTION

The general adage that "no life without water" emanates because water is an important need of life accompanying everyday activities, and it is utilized in many ways in the localities and the need in quantity, together with the qualities, differs. The usages entail domestic, public, industrial and agricultural purposes [1 - 2]. Precisely, in Nigeria, about fifty-two percent of the populace does not have links to good drinkable water doubled by industries that are also deficient in links to good quality water. And the drinkable water standard is on the basis of two major criteria, like the appearance of offensive tastes, odor together with color coupled with the appearance of substances which have affected badly – physiologically [3].

Practically, water is known to be a universal solvent whose capability allows it to dissolve all solutes which are vital to the living and those things that do not have lives [4-5]. Water is a resource that can be utilized for a wide range of aims, as mentioned earlier, and river water is important to the growth of nations. Water is atypically available on the earth's surface as in fresh potable water is not accessible during periods of need or ecosystem usage [6].

Definably, the quality of water is a set of physical and chemical together with attributes that are satisfactory in order to grantee that the water provided is reliable for consumption. Meanwhile, polluted water causes bad health for a representation of the number of people over predicted time and is as a result of the growth of the population together with urbanization [7]. Also, the expansion of the human populace, the widespread development of industries, the intensification of the practice of agriculture, together with the emission of enormous amounts of waste water into rivers and creeks have caused a decline in the quality of water. Inappropriate water systems managerial laws may also result in severe challenges in accessibility together with the quality of water, due to the conspicuous fact that water quality coupled with human beings are relatively in. Also, the degeneration of the quality of water of the surface together with ground water, whose one of its roots, is linked to the emission of water that has been polluted as a result of domestic industrialization together with agriculture's sources into the water bodies [8].

Regrettably, suitable water existence is brief naturally and is instantaneously contaminated via predominating facts about the environment coupled with the activities of human beings. This makes the water not fit to be consumed without treatment. The contaminants of industries related to organic matter, non-organic

solids that have dissolved together with other not needed chemicals that seriously affect the water quality[9]. Moreso, water-affiliated diseases remain to be one of the cardinal challenges to health worldwide as a result of the consumption of polluted water, thereby causing the rise in diarrhea among infants together with children [10].

Furthermore, water is one of the most vital natural resources for everybody living on the earth's surface, but as a result of dissimilar activities, the quality together with the quantity of water has been affected badly [11]. The concomitant of water-borne diseases coupled with the epidemically contagious diseases in the Gbaramatu Kingdom due to intake of not-so-good drinkable water has necessitated this study. The results of this study will assist in educating the people around the area about the water they consume, whether it is good or not.

II. MATERIALS AND METHODS

Materials used

The study area of this paper is Kurutie Community in Gbaramatu Kingdom of the Warri South – West Local Government Area of Delta State, Nigeria. This also happened to be the area where Nigeria Maritime University, Takeoff Campus, is situated. The various methods, the experimental test were conducted are: electrometric technique – SM4500-H+B; SM 2540C; Conductibility SM 2540B; SM 2540D; EDTA – Titrimetric M2340C and argentometric – SM4500CI- B respectively and the materials utilized are: pH meter, breaker, buffer, evaporating dish – 100ml beaker, 100ml and 10ml – measuring cylinders, hot plate, drying oven, analytical balance, glass filer or filter paper :Whatman -42, desiccator, conductivity meter, conductivity standard solution, distilled water, conical flasks – 250ml, clamp and stand, and burette.

Methods

The samples of water were collated from the Gbaramatu Kingdom, from a Kurutie Communityvia a water distribution agent. The water samples collated include two bottled water and one sachet water, which is also known as 'pure water'. The samples were labeled A, B and C respectively. Sample A is a Bottled Water and Sample B is diferent bottled water, while Sample C is a Sachet Water. Samples A and B are bottled waters with different company names. The different samples were kept in a cool flask of about 250ml of ice, and then they were conveyed to Petroleum Training (PTI), Effurun, Delta State, Nigeria - Water Test Laboratory for physical, chemical together with biological investigations. The investigation includes – pH, turbidity, color, odor, total dissolved solids, conductivity, total alkalinity, chloride, total hardness, Sulphate, nitrate, total iron, lead and coliform counts respectively and the results was taken and recorded and compared to [2] and [4] respectively.

III. RESULTS AND DISCUSSION

Results

Table 1 encompasses the results of the experimental test conducted on the three samples of the water A, B and C respectively in comparison with World Health Organization (WHO) standard. The different water parameters are also in **Table 1**

Table 1: Experimental Test Results of Samples A, B and C

S/No.	Parameters	Sample A	Sample B	Sample C	WHO Standard
1	pH	6.5	7.1	6.4	6.5 – 8.5
2	Turbidity (NTU)	< 0.1	< 0.1	< 0.1	50
3	Colour	colourless	colourless	colourless	NA
4	Odour	Unobjectionable	Unobjectionable	Unobjectionable	NA
5	Total Dissolved Solids (mg/l)	2.0	23.0	39.0	500.0
6	Conductivity (us/cm)	4.0	46.6	78.0	250.0
7	Total Alkalinity (mg/l)	20.8	62.2	29.3	NA
8	Chloride (mg/l)	60.0	75.0	200.0	250.0
9	Total Hardness (mg/l)	0.1	0.2	0.3	500.0
10	Sulphate (mg/l)	< 1.00	< 1.00	< 1.0	250.0
11	Nitate (mg/l)	0.09	0.04	0.01	50.0
12	Total Iron (mg/l)	< 0.006	< 0.006	< 0.006	0.0 – 30.0
13	Lead (mg/l)	< 0.01	< 0.01	< 0.01	0.01
14	Coliform count (cfu/100ml)	0.0	0.0	0.0	0

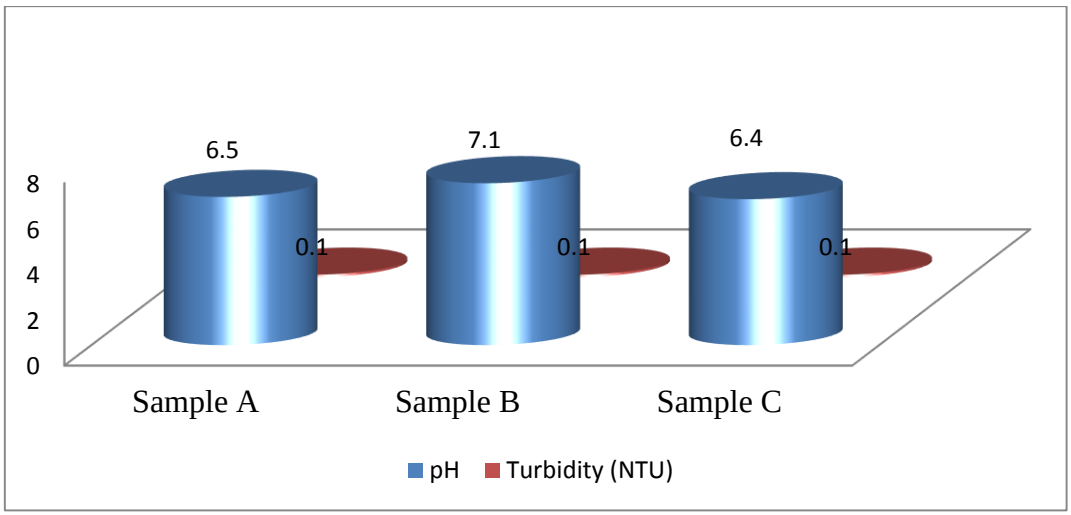

Fig. 1. Bar chart Representing pH and Turbidity

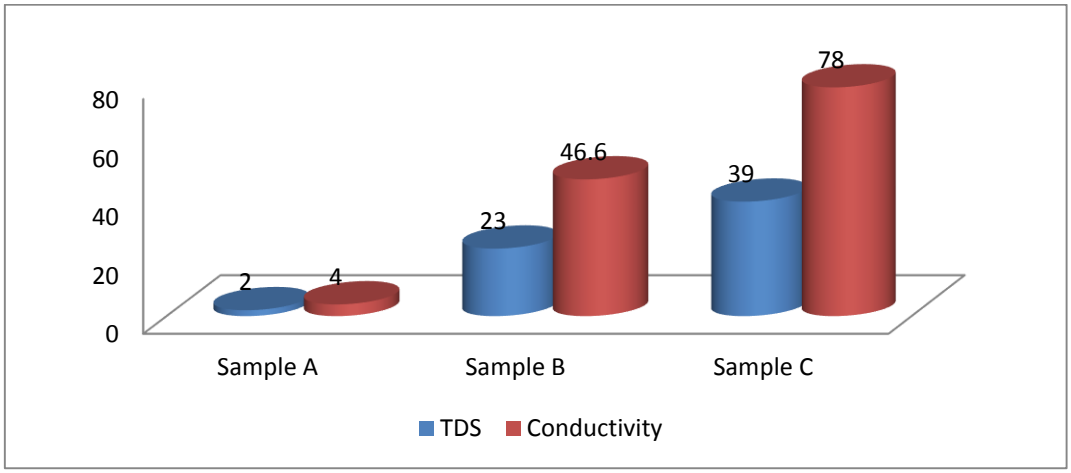

Fig. 2 Bar Chart of TDS and Conductivity

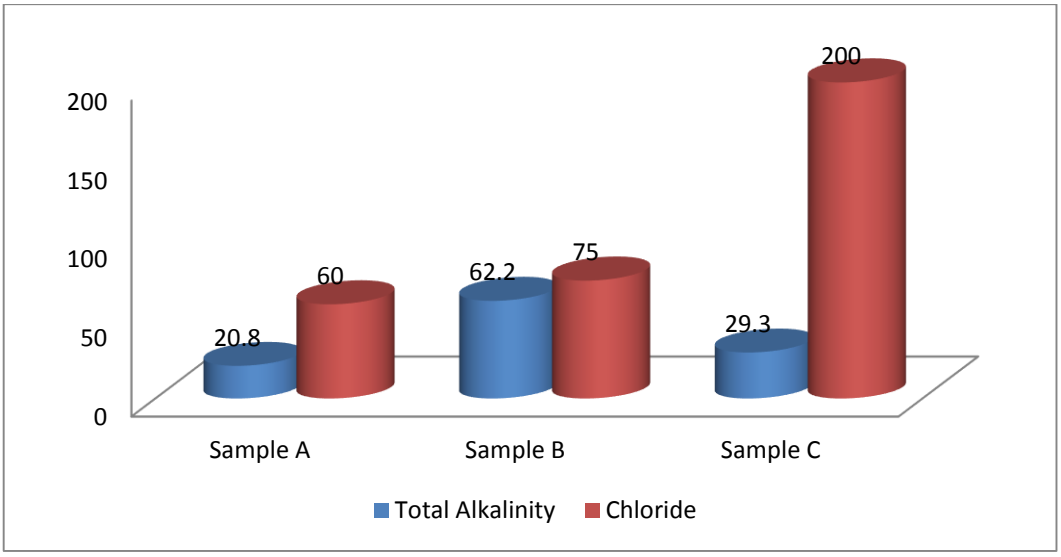

Fig. 3 Bar Chart of Alkalinity and Chloride

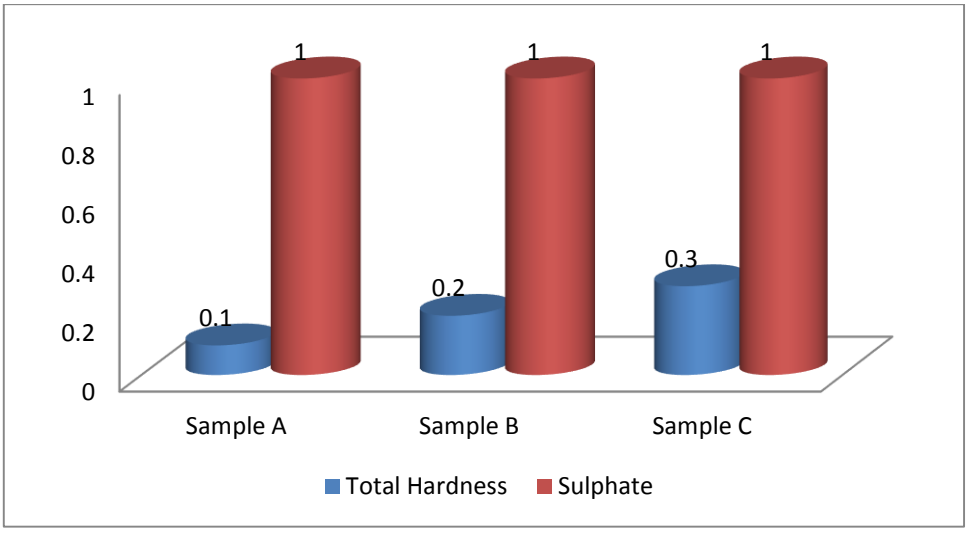

Fig. 4 Bar Chart of Total Hardness and Sulphate

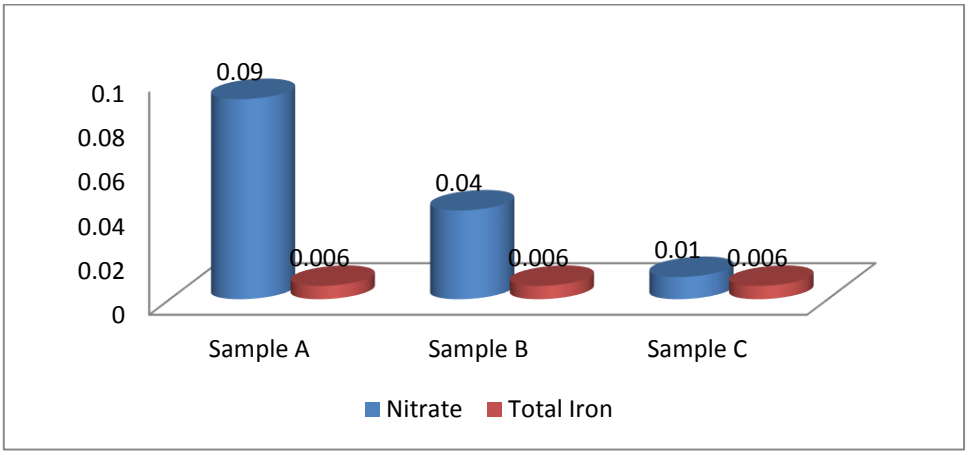

Fig. 5 Bar Chart of Nitrate and Total Iron

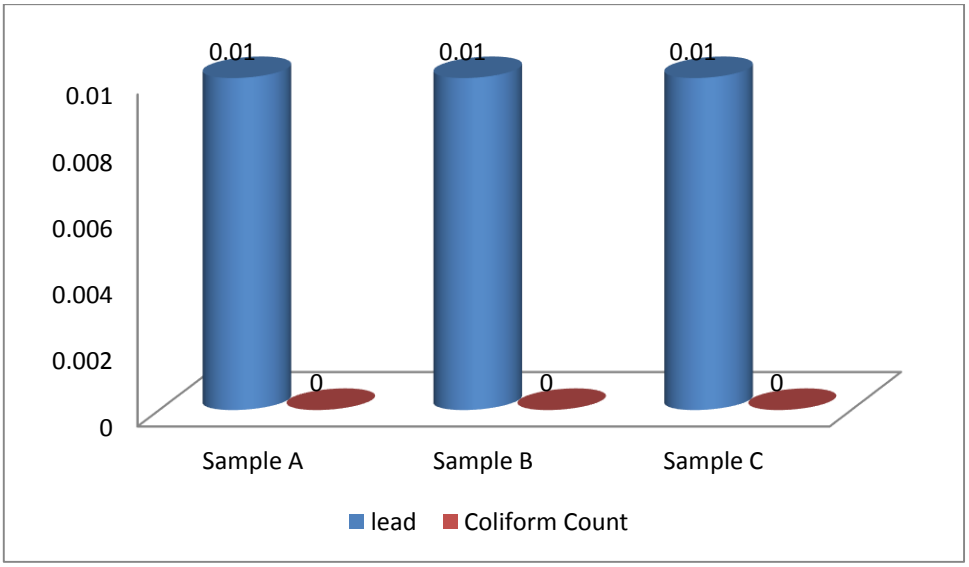

Fig. 6 Bar Chart of Lead and Total Iron

Discussion

Precisely, in the **Table 1** serial number 3 and 4 reveal the test results for the colour and the odour of the three water samples taken to the PTI Laboratory for test. It further reveals that the Samples A, B and C are Colourless and unobjectionable respectively. This also signifies that they do not have significant effect on aquatic plants and they are good for health and aquatic life. **Figure 1** is a bar chart depicting the pH and the turbidity. The Sample B water has a good quality of pH in comparison to WHO standard of 6.5 -8.5 while the other – Samples A and C are apt to acidic because of their values of 6.5 and 6.4 respectively. In the other hand, the Samples A, B and C have good turbidity because it is less than 0.1NTU and it indicates that the waters are very clean and free from suspended solid particles. **Figure 2** is a bar chart illustrating total dissolved solids and the conductivity. It reveals that the three samples A, B and C are okay in terms of the TDS of 2mg/L, 23mg/L and 39mg/L: since they meet the WHO Standard of 500_{max}. Also, the three water samples A, B and C are good to health because of the low conductivity of 4us/cm, 46.6us/cm and 78us/cm in comparison to WHO standard of 250_{max}. **Figure 3** represents the bar chart of the total alkalinity and chloride. The graph reveals that the three water samples have a quality alkalinity level of 20.8mg/L, 62.2mg/Land 29.3mg/L respectively and the chloride content of 60mg/L, 75mg/L and 200mg/L respectively show that the water is good for drinking since it is conformable to WHO standard of 250_{max}. **Figure 4** depicts bar chart representation of the total hardness and Sulphate of the three water samples. It shows that the three water samples has a total hardness (0.1mg/L, 0.2mg/L and 0.3mg/L) and Sulphate (less than 1mg/L) contents that is conformable to WHO standard of 500_{max} and 250_{max} respectively. This further reveals that the three water samples is good for health since it is free from diseases and ugly bitter tastes. **Figure 5** is the depiction of the nitrate and total iron presence in the three water samples of A, B and C respectively. The graph reveals that the Sample A has the best nitrate content of 0.01mg/L followed by the Samples B and C of 0.04mg/L and 0.09mg/L respectively and they are hygienically good for consumption. The three water samples of A, B and C meets the WHO standard of 0.30mg/L of total Iron since the test results for the three water samples depict less than 0.006mg/L. Also, the water is good for consumption. Finally, the **Figure 6** illustrates the presence of lead and coliform count in the three water samples. The lead content of less than 0.01mg/L conforms to the WHO standard of 0.01mg/L and it further reveals that the water is free from deadly diseases. Also, the three water samples show that there is no content of coliform count and it also conforms to the WHO standard of 0 cfu/100ml. This revelation depicts that there is no bacteria in the water and therefore good for human consumption.

IV. CONCLUSION

The need to appraise the qualities of the different waters supplied in Gbaramatu Kingdom emanated because of water pipe borne related diseases and the appraisal of different water qualities has been conducted. The samples of water were collated from the Gbaramatu Kingdom; from Kurutie Community via a water distribution agent. The water samples collated include two bottled water and one sachet water which is also known as 'pure water'. The samples were labeled A, B and C respectively. The Sample A is a Bottled Water and Sample B is a different Bottled Water while Sample C is a Sachet Water. The Samples A and B are bottled waters with different company names. The different samples were kept in a cool flask of about 250ml with ice and then it was conveyed to Petroleum Training (PTI), Effurun, Delta State, Nigeria -Water Test Laboratory for physical, chemical together with biological investigations. The investigation includes – pH, Turbidity, Color, Odor, total dissolved solids, conductivity, total alkalinity, chloride, total hardness, Sulphate, nitrate, total iron, lead and coliform count respectively and the results was taken and recorded. The results obtained show that all the three samples A, B and C meets with the WHO standard and therefore the water is good for drinking and domestic usage. It is recommended that this test should be repeatedly conducted yearly.

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