

COMPARATIVE STUDY OF THE BACTERIOLOGICAL QUALITY OF WATER FROM WATER TANKERS AND TAP WATER IN KASOA, GHANA

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Introduction

- ❖ Water has a profound effect on human health both as a means to reduce disease and a media through which disease-causing agents may be transmitted.
- ❖ In developing countries, governments face the problem of how to supply sufficient water of good quality at a reasonable price to their citizens.
- ❖ In many cases, the supply of water cannot keep pace with the demand due to the inadequate capital for the expansion of the water supply systems..

Introduction Continued

1.1 STATEMENT OF PROBLEM

Majority of households in Kasoa, within the Awutu Senya East Municipal Assembly in the Central Region of Ghana lack access to safe drinking water. Water supplied by the Ghana Water Company does not flow regularly, hence making the indigenes resort to the water tanker services.

Some patrons of the tanker service have raised doubts about the quality of water delivered by the tankers. These claims are however based on mere perception without any scientific analysis.

The purpose of this paper therefore is to verify the claims of patrons of alternative water supply by tanker operators in Kasoa that the water served them is of poorer quality than that recommended for human consumption.

The study will provide baseline information on the quality of water provided by the Ghana Water Company and also the various water tanker service operators with regards to the selected physico-chemical and bacteriological parameters and its reflective immediate or cumulative impacts on health upon consumption. Based on the intensity of the findings, the study may also assist in advising government on policy regarding regulation for private tanker service operation for the provision of potable water in the country and also advise on monitoring of their services to ensure that they work under hygienic conditions.



Specific objectives were:

- To determine the physico-chemical and bacteriological quality of tap water and water delivered by the tanker services in the study area.
- To compare the results of analyses with the WHO and Ghana Drinking Water Standards
- To make recommendations for improvement on its quality if found otherwise.
- To advise consumers on whether they should resort to water tanker service or not.

Methodology

Sampling Procedure

- ❖ Samples were taken in January and March.
- ❖ This is so because it is during this period that water potable water is scarce in Ghana.
- ❖ For the physico-chemical analysis, 1-Litre plastic containers were used.
- ❖ Samples for bacteriological analysis were however taken in polypropylene bottles. All samples were analysed within 24 hours.

Methodology

In all, Ten (10) samples were taken. One (1) sample was taken from the hydrant, three (3) each from water tankers, Tanker Service Customers and Customers who receive water through GWCL distribution pipelines.

Results

PARAMETER	UNIT	WHO GUIDELINE VALUES	HYDRANT	WATER TANKERS			PATRONS OF TANKER SERVICE			GWCL DIRECT SUPPLY		
				1	2	3	1	2	3	1	2	3
pH	-	6.5-8.5	7.3 ±0.01	7.3 ±0.21	7.2 ±0.21	7.4 ±0.23	7.3 ±0.25	7.0 ±0.21	7.1 ±0.15	7.1 ±0.19	7.0 ±0.22	7.1 ±0.25
Colour	mg/L -Pt.Co	15	5	10	17	21	10	15	18	5	4.5	4
Turbidity	NTU	5	4.0 ±0.2	6 ±1	7 ±1.2	9 ±0.5	5 ±0.3	7 ±0.2	7 ±1	4 ±0.2	5 ±0.12	5 ±0.22
EC	(µS/cm),	1000	222.50 ±42.03	164.57 ±41.57	231.53 ±53.23	246.46 ±47.43	285.61 ±41.29	188.78 ±84.70	229.73 ±48.09	198.72 ±69.55	215.41 ±59.22	178.60 ±44.72
Alkalinity	mg/L	400	92.22 ±0.90	99.61 ±7.91	101.76 ±2.33	94.36 ±2.62	101.60 ±2.57	90.43 ±4.66	99.63 ±2.41	103.00 ±5.84	98.18 ±6.06	93.55 ±2.14
T. Hardness	mg/L	500	83.47 ±4.99	71.15 ±2.27	91.07 ±0.53	94.54 ±4.50	79.94 ±3.88	90.73 ±3.70	89.94 ±0.88	80.28 ±0.46	82.59 ±9.19	75.86 ±8.00
Residual Chlorine	mg/L	0.1-0.3	0.15	0	0	0	0	0	0	Trace	0.1	0.1
Total Iron	mg/L	0.3	0.1 ±0.02	0.2 ±0.2	0.5 ±0.010	0.7 ±0.001	0.3 ±0.002	0.4 ±0.002	0.2 ±0.003	0.1 ±0.002	0.1 ±0.001	0.05 ±0.002
Faecal Coliforms	MPN/100ml	0	0	16	>16	>16	16	9.2	16	0	0	0

Discussion

Water quality at the hydrant

The results obtained from the analysis show that, the samples taken from the hydrant met the WHO requirement for all the parameters analysed. This is due to the proper management of the facility by keeping the surroundings clean, prompt repair of leakages and the installation of structures to hang hoses used for drawing water.


Water quality in the tankers

Colour, turbidity, residual chlorine and faecal coliform values for all the samples taken from these tankers did not meet the WHO guideline values.

The high level of total iron could be linked to corrosion in the tanks, as was observed on the external surfaces of some of the tankers.

Corrosion and, hence, the introduction of iron in the tanks could also be responsible for the high colour and turbidity.

High colour, turbidity and total iron could be major contributors to any objectionable appearance of the water which might have been the basis of customer complaints.



The presence of chlorine residual in drinking water indicates that a sufficient amount of chlorine was added initially to the water to inactivate the bacteria and some viruses that cause diarrheal disease; and also to ensure that the water is protected from recontamination during storage. The presence of free residual chlorine in drinking water is correlated with the absence of disease-causing organisms, and thus is a measure of the potability of the water.

From the results obtained, it can be observed that all the water samples from the Water Tankers did not contain residual chlorine due probably to the high turbidity, colour and iron in these samples which might have consumed the chlorine in the water and the resultant high levels of fecal coliforms in these samples.

Quality of water served to tanker service customers

Water served to the tanker service customers failed in the same parameters as that of the tankers. These are colour, turbidity, iron, iron and faecal coliforms. These values were also lower than values for the tankers due probably to settlement in the storage receptacles. Though colour, turbidity and iron may not have adverse effects on public health other than consumer confidence, they serve as sanctuary for faecal coliforms and that the presence of these organisms in water is rather serious and calls for prompt action to protect public health.

Quality of water served directly to customers through GWCL pipelines

Water sampled from all customers who are served directly through GWCL pipelines however passed in all the parameters. There was no faecal contamination or high colour as recorded at the hydrant. This indicates that water supplied by the GWCL is of good quality and meets all required standards. This also affirms the fact that contamination in the water tankers through poor management is the main cause of contamination of water supplied by these tankers and not from the GWCL treatment and distribution system.

CONCLUSIONS

From the results of the study, the following conclusions are being made:

- water supplied by tanker operators in Kasoa is contaminated with faecal matter and has high colour, turbidity, iron, no residual chlorine and high faecal coliform above the WHO guideline due to poor management of the tankers.
- faecal contamination from the tankers is transferred to the households of patrons of tanker services
- there is further colour impartation in the tankers and introduction of higher levels of turbidity and total iron than those recommended by the WHO, probably, due to poor management of the tanks by their operators;

- water delivered to the final consumer by tankers is contaminated with faecal matter and possess high levels of physical parameter like colour and turbidity, which may be the cause of consumer complaints about the quality of the water;
- piped water supplied directly by the GWCL to consumers at Kasoa satisfies the WHO guideline values for all parameters examined, which confirms that the poor quality of water supplied by the tankers does not arise from the GWCL treatment and distribution system, in general, but the poor management of the water tankers.

RECOMMENDATIONS

GWCL, as a public utility which is unable to supply piped water to all sections of the populace, should place a high premium on the tanker services as an alternative to conventional water supply by:

- a. liaising with the Ministry of Sanitation and Water Resources to set up a body for the monitoring of the activities of these Tanker Services. This will include licensing, regular sampling of water from these tankers, cleaning and disinfection of water tankers, as well as tracking to ensure that they fetch drinking water from approved sources.
- b. taking steps to pave and tidy up the immediate surroundings of the hydrant to avoid stagnation of water around it and ensure its proper operation and maintenance;
- c. providing structures for hanging of the hoses which are used by the tanker operators to draw and discharge water
- e. Educating consumers on the need to patronise water from only licensed tankers



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