CONTAMINATION OF SURFACE AND GROUND WATER DUE TO ANTHROPOGENIC ACTIVITIES IN OGWUAMA COMMUNITY OF AHIAZU, IMO STATE, NIGERIA.

BY

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INTRODUCTION

Water is very important in our day to day activities. Sources of water in Ogwuama community are stream and ground water. The quality of water source is influenced majorly by anthropogenic activities. Such as cassava fermentation and intensive agricultural practice, washing of cloths, bathing, defecation and discharge of massive amount of waste around the water source.

The quality of water can be determined by monitoring microbial load especially feacal coliform and physico-chemical parameters like pH, Dissolved oxygen, Biochemical oxygen demand etc.

MATERIALS AND METHOD

STUDY AREA

Ogwuama in Ahiazu Mbaise, Imo State of Nigeria is located within 7° 14' 348" to 7° 18' 44" E and 5° 31' 006" to 5° 35' 56" N. The climate of the area is humid tropical and typifies the rain forest zone of the equatorial region. Mean ambient temperature is 28°C. Wet season last between April to November with a short dry season lasting the rest of year.

SAMPLE COLLECTION

Water samples were randomly collected from Onuakpaka stream using 500ml sterile containers at three different points on the upstream and downstream and from three different public groundwater using standard method.

- Furthermore, the physico-chemical and microbial analysis were also carried out using standard method.
- The pH, temperature, conductivity, total dissolved solid and dissolved oxygen were determined in-situ using jenway(Hanna 1910) multipurpose tester in each sampling point while the BOD was determined using a winkler method for a period of five days at 20°C.

Table 1: The physico-chemical and microbial analysis results of well water.

Parameter	FMEMV Standard	WHO Standard (2008)	Ground water 1	Ground water 2	Ground water 3	Mean value
pH	6.5 – 8.5	6.5 – 9.5	6.06	6.07	6.05	6.06
Temp (°C)	20 – 30	N/A	26	28	27	27
Conductivity (Us/cm)	100	100	109	111	107	109
Turbidity (NTU)	10	5	0.00	0.00	0.00	0.00
DO (mg/l)	>4	4	4.18	4.20	4.22	4.20
BOD (Mg/l)	10	6	1.8	2.1	2.1	2.0
Total Dissolved solid(mg/l)	250	250	70.87	70.85	70.83	70.85
Total Chloride(mg/l)	250	250	-	145.08	145.10	145.08
Total Hardness(mg/l)	200	200	145.06	2.1	2.4	2.3
Nitrate(mg/l)	40	45	22.88	22.93	22.89	22.90
Total faecal count (cfu)	0	N/A	9	11	10	10
Total E-Coli Count(cfu)	0	N/A	9	9	6	8

Table 2: The physico-chemical and microbial analysis results of Upstream.

Parameter	FMEMV Standard	WHO Standard (2008)	Upstream 1	Upstream 2	Upstream 3	Mean value
pH	6.5 - 8.5	6.5 – 9.5	5.71	6.69	5.70	5.70
Temp (ºC)	20 – 30	N/A	27	27	27.3	27.1
Conductivity (Us/cm)	100	100	8	10	12	10
Turbidity (NTU)	10	5	14.65	14.30	15.33	14.76
DO (mg/l)	>4	4	3.57	3.55	3.68	3.60
BOD (Mg/l)	10	6	2.4	2.0	1.99	2.1
Total Dissolved solid(mg/l)	250	250	6.00	6.40	7.10	6.50
Total Chloride(mg/l)	250	250	65.9	70.0	82.81	72.9
Total Hardness(mg/l)	200	200	0.5	0.6	0.7	0.6
Nitrate(mg/l)	40	45	10.97	10.90	10.83	10.90
Total faecal count (cfu)	0	N/A	22	22	22	22
Total E-Coli Count(cfu)	0	N/A	9	12	18	13

Table 3: The physico-chemical and microbial analysis results of downstream.

Parameter	FMEMV Standard	WHO Standard (2008)	Down-stream 1	Down-stream 2	Down-stream 3	Mean value
pH	6.5 - 8.5	6.5 – 9.5	5.80	5.90	6.00	5.90
Temp (°C)	20 – 30	N/A	27.1	27.3	27.5	27.3
Conductivity (Us/cm)	100	100	11	11	14	12
Turbidity (NTU)	10	5	15.48	15.60	16.14	15.74
DO (mg/l)	>4	4	3.57	3.80	3.85	3.80
BOD (Mg/l)	10	6	0.79	0.70	0.61	0.70
Total Dissolved solid(mg/l)	250	250	7.10	7.60	8.70	7.80
Total Chloride(mg/l)	250	250	150	172.6	224	182.2
Total Hardness(mg/l)	200	200	0.65	0.70	0.75	0.70
Nitrate(mg/l)	40	45	0.36	0.28	0.26	0.30
Total faecal count (cfu)	0	N/A	28	40	52	40
Total E-Coli Count(cfu)	0	N/A	20	22	27	23

Table 4: The mean standard deviation of the water samples

Parameters	FMENV Std	Well water	Up stream	Down stream
pH	6.5-8.5	6.06±0.01	5.70±0.01	5.90±0.10
Temp (°C)	20-30	27.00±1.00 [a]	27.10±0.17 [a]	27.30±0.20 [a]
Conductivity (Us/cm)	100	109.00±2.00[b]	10.00±2.00 [b]	12.00±1.73 [b]
Turbidity (NTU)	10	0.00±0.00	14.76±0.52	15.74±0.35
DO (mg/l)	>4	4.20±0.02	3.60±0.07	3.80±0.05
BOD (Mg/l)	10	2.00±0.17	2.13±0.23	0.70±0.09
Total Dissolved solid(mg/l)	250	70.85±0.02[c]	6.50±0.56 [c]	7.80±0.82 [c]
Total Chloride(mg/l)	250	145.08±0.02[d]	72.90±8.82 [d]	182.20±3.02 [d]
Total Hardness(mg/l)	200	2.30±0.17	0.60±0.10	0.70±0.05
Nitrate(mg/l)	40	22.90±0.03[e]	10.90±0.07 [e]	0.30±0.05 [e]
Total faecal count (cfu)	0	10.00±1.00[f]	22.00±0.00 [f]	40.00±5.00 [f]
Total E-Coli	0	8.00±1.73[g]	13.00±4.58 [h]	23.00±2.65 [g h]

DISCUSSION

- ✓ The mean pH values recorded showed that ground water, upstream and downstream waters are slightly acidic and below the lower permissible limit recommended by WHO and FMENV. This may be due to the organic contamination which may come from natural leachates, atmospheric droplets and human contamination during fermentation of cassava in the water.
- ✓ The mean temperature of the water samples collected was within the permissible limit.

- ✓ The mean values of conductivities of ground water is a little bit higher than WHO/FMENV limits while that of upstream and downstream waters are lower.
- ✓ From the mean values of turbidity of the waters, ground water is below the permissible limits while that of upstream and downstream waters were above the permissible limits and can shield the pathogenic organisms. Therefore, the higher the turbidity, the more energy and chemicals required for water treatment (Obasi *et al*., 2004).

- ✓ Results of the heterotrophic bacterial count showed that the ground water had the lowest load. This is simply a measure of the number of live bacteria present in water and does not necessarily indicate health threats.
- ✓ Faecal coliform bacteria were detected in all the water samples collected but were a bit much in the downstream water. According to FMENV standards, drinking water should have zero faecal coliform bacterial count in 100ml of the water. It is most likely that faecal contamination arises from human activities.

- The mean values of *E. coli* detected (0.8 x 10^1Cfu/ml) in the well water, (1.3 x 10^1cfu/ml) in the upstream water and (2.3 x 10^1cfu/ml) in the downstream water. *E. coli* is normally a harmless commensal in the alimentary canal of a man and other animals. However, some sero-types frequently cause gastroenteritis characterized by severe diarrhea with mucus or blood and with dehydration but usually without fever. Children, especially the newborn are usually affected but increasing cases of adult diarrhea caused by *E. coli* are also being noted (Okafor, 1985). Therefore, the presence of *E. coli* in the waters makes it potential health risk to its

CONCLUSION

- Due to the heavy bacterial load, the water sampled were not good drinking and for other domestic activities. There is need to reduce most anthropogenic activities around the water source especially those that have negative impact on the water body such as defecation (both humans and animals), fermentation etc.
- This will help to improve the sanitization of water for domestic use since the stream and ground water are the major sources of water in this area.
- Furthermore, sinking of shallow borehole should be discouraged.

Thank you.