

Abattoir Effluents and Population Health Risks

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Abstract

Background: Abattoir activities are associated with some environmental risks. The untreated effluent when discharged to the surface water exposes the people to some water related illnesses. This study assessed the health risks of people dependent on abattoir polluted stream water for some domestic uses.

Materials and Methods: One hundred households in the study area were randomly sampled to ascertain the uses of the stream water. Hospital record was used to show the prevalence of some water borne diseases. Abattoir effluent from the two abattoirs were tested in the laboratory to determine their physico-chemical and microbiological constituents before discharge to the stream likewise water samples collected at the point of abstraction. Both abattoir effluent and water samples were tested for temperature, turbidity, EC, pH, TDS, TSS, Chloride, sulphate, phosphate, nitrate, iron, sodium, BOD, COD, DO, E.coli and total coliform. Water quality was compared with WHO recommended limits for drinking and represented graphically for ease of understanding.

Results: The stream water is used for domestic purposes such as bathing, washing clothes and kitchen utensils. Hospital records show that typhoid fever occur all the time while gastro-intestinal infections, dysentery and skin itching occasionally occur. Abattoir effluent contain pollutants while the stream water at the point of abstraction show that temperature, phosphate, nitrate, BOD, COD and E.Coli were higher than the WHO recommended limits for drinking water in both seasons while iron and total coliform recorded higher only in dry season.

Conclusion: Abattoir contaminated stream water exposes the people to water borne illnesses. This study as a result suggested treatment of abattoir effluent before discharge or treatment of the stream water prior to usage.

Key Word: Abattoir effluent, water quality, health risk.

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I. Introduction

Streams play important role in domestic water supply especially in developing countries. The idea of stream water supply generally stems from the fact that there is impairment in domestic water supply in Nigeria and developing countries in general. Untreated abattoir effluents contribute to stream water pollution where it is channeled directly into the stream without treatment.

Abattoir is any premises used for or in connection with the slaughter of animals whose meat is intended for human consumption and include a slaughterhouse but does not include a place situated in a farm¹. Abattoir wastewater is water that has been used in cleaning up of slaughtered cattle, sheep, goat and pig carcasses, the floor of the slaughter hall, personnel and slaughter equipment². Abattoir, a necessary facility to meet the population demand for meat but improper management bring some negative impacts on health (both human and aquatic) and the environment. The abattoir industry is a vital constituent of the livestock industry because it makes available domestic meat to over 150 million people and makes jobs available for a large number of people in Nigeria³. Abattoir wastewater could significantly intensify the amounts of nitrogen, phosphorus, and total solids in the receiving water body⁴. Waste water from the abattoir is usually concentrated sources of oxygen consuming waste⁵.

With the growing incidences of water borne diseases and increasing threat to human life, decline in the quality of life and consequent reduction in working hours, it is necessary to examine the dangers associated with the consumption of abattoir contaminated stream water. The health of a population is a major consideration for an active workforce. The necessity of water is of utmost importance in daily human activities. Untreated abattoir effluent however may constitute a public health threat due to the possibility of transmission of pathogens to humans⁶.

Abattoirs are known all over the world to pollute the environment either directly or indirectly from their various processes⁷. Several reports have it that untreated abattoir effluents are disposed directly into surface waters in Nigeria^{8,9,7,10}. Effluents discharged from abattoir facilities pose serious health and environmental risk to communities who rely on the receiving watershed as primary source for domestic or

recreation activities^{10,11}. Research has shown that abattoir effluent impacts negatively on soil¹², well water¹² and ground water¹³.

Moreover,¹⁴ Cadmus et al (1999) showed that zoonotic diseases are yet to be eliminated or fully controlled in more than 80% of the public abattoirs in Nigeria.² identified seven pathogenic species of bacteria species in abattoir effluent. This study seeks to investigate the population health implication of abattoir effluents in Enugu streams.

Abattoir wastes can have a detrimental effect on the environment, public health, animal health and economy of the country if they are not effectively managed and controlled¹⁵. Although, several methods of waste treatment have been developed for reasons of public health and conservation¹², the study area observes no safety practices in terms of effluent treatment prior to discharge. This study therefore assessed the population health risk of the people who utilize the abattoir contaminated water downstream.

II. Materials and Methods

Abattoir wastewater samples were collected from the two abattoirs and stream water was collected from the point at which the community utilize the water for several domestic purposes. The samples were tested for the following selected physicochemical and microbiological parameters: Temperature, Turbidity, Electrical conductivity, pH, TDS, TSS, Chloride, Sulphate, Phosphate, Nitrate, Iron, Sodium, BOD, COD, DO, *E.coli* and Total coliform. The water tests were carried out in rainy and dry seasons to reflect seasonal changes in water quality. The physicochemical and microbial quality of the water samples was determined using the American Public Health Association (APHA) Standard Methods¹⁶. One hundred households were sampled to ascertain the uses of the stream water while hospital records show water borne diseases common in the study area.

III. Study Area

The study area is the New Artisan Market in Enugu North L.G.A, Enugu state, Nigeria. It has two public abattoirs where similar operations are carried out. The difference being that while one mainly slaughters cows while the other is mainly goat. However, there are no differences in the technique employed. The first abattoir is located on Latitudes 6°27'15.90"N and Longitudes 7°32'30.6"E. The second is located at Latitudes 6°27'08.26"N and Longitudes 7°32'33.58"E. Abattoir operations in the study area include slaughtering of animals (plate 1), washing of the slaughtered animals and channeling of wash water untreated into the streams (plate 2). Meanwhile, a community downstream makes use of the water for domestic purposes.



Plate 1: Animal slaughtering



Plate 2: Untreated effluent channeled into the stream

IV. Methodology

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One hundred households were sampled to ascertain the uses of the stream water while hospital records show water borne diseases common in the study area.

V. Result

Result of the abattoir effluent and water samples at the point of extraction by the communities are on table (1).

Table1:Physico-chemical and Microbiological Characteristics of abattoir effluent and water samples in rainy and dry seasons.

Parameters	Abattoir Effluent	Point of Abstraction	
		RS	DS
Temperature (°C)	27.6	27	27
Turbidity (NTU)	20	6.8	6
EC (µs/cm)	8825	210	231
Ph	7.2	6.06	6.3
TDS (mg/l)	5681	117.09	310.15
TSS (mg/l)	4.38	0.65	0.02
Chloride (mg/l)	1592	24.14	37.95
Sulphate (mg/l)	55	25.92	29.7
Phosphate (mg/l)	64.5	30.8	47.5
Nitrate (mg/l)	76.6	16.08	46.4
Iron (mg/l)	3.75	0.04	1.21
Sodium (mg/l)	9.1	6.3	6
BOD (mg/l)	171.75	28.8	38.4
COD (mg/l)	511	48.9	96
DO (mg/l)	BDL	9.9	4.2
Ecoli (cfu/100ml)	20	5	12
Total Coli (cfu/100ml)	24.5	3	11

RS: Rainy season; DS: Dry season

VI. Discussion

Result of the abattoir effluent indicates strong pollution impact. As the stream water moves downstream from the point of discharge, there is reduction in pollution level but temperature, phosphate, nitrate, BOD, COD and E.Coli were higher than the WHO recommended limits for drinking water in both seasons (figure 1). Iron and total coliform recorded higher only in dry season. Nevertheless, the stream water at that point still pose some health risks when it finds its way into the human body without treatment.

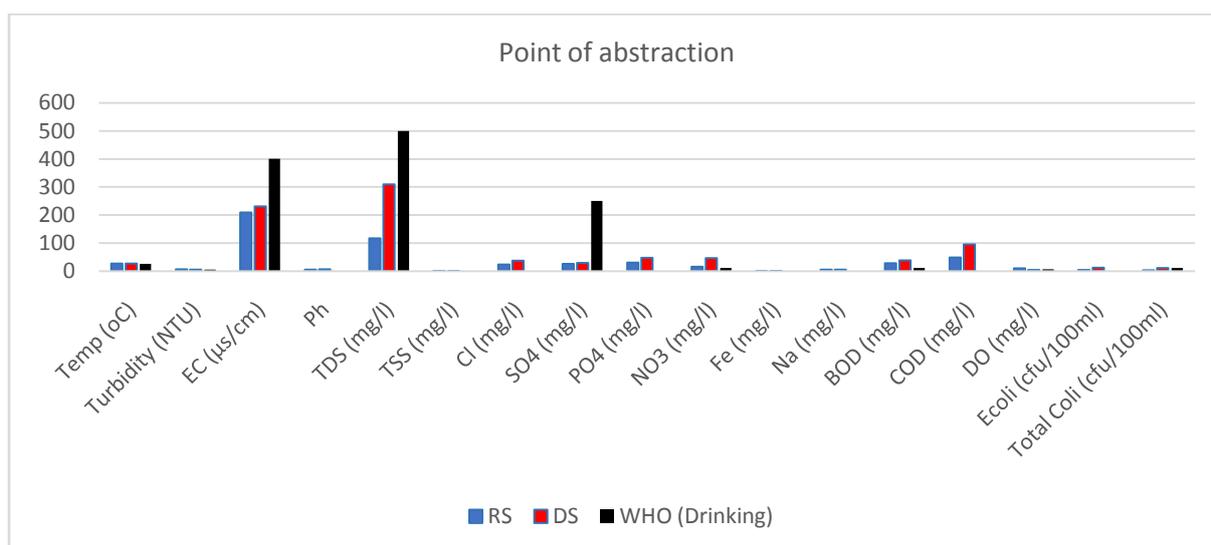


Figure 1: Stream water at the point of abstraction as compared with the WHO recommended limits for drinking

Medical records from the community hospital show that typhoid fever mostly occur, followed by dysentery, skin itching and gastro-intestinal infections. Although these water borne illnesses cannot be exclusively attributed to the abattoir effluent contaminated stream water, there is likelihood from all indications

that the stream water exposes the inhabitants of the study area to these illnesses since no precaution precedes consumption of the stream water.

VII. Conclusion

Paucity of pipe borne water necessitates that the inhabitants in the study area utilize the stream water available to them. However, unwholesome upstream activities predisposes them to water borne illnesses since there exist no form of treatment before consumption. Treatment of abattoir effluent before discharging into the surface water is therefore crucial or the stream water prior to usage.

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