Assessment of Health Effect of Water Pollution in Maiduguri Metropolis

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Abstract
This study is to ascertain the levels of water pollution and its health impacts in some selected areas in Maiduguri, Nigeria. Simple frequencies were used to find out the level of water pollution in relation to health within the study area with illustrated charts. The research shows that the effect of the water pollution is very high in the study area with corresponding negative health impacts. It provides valuable information to researchers who intend to work on water pollution and its effects in general. Proper water treatment and awareness campaigns are strongly recommended for residents of Maiduguri metropolis.

Keywords: Health, Water, Pollution, Human, Water Pollution, Maiduguri

Introduction
In Life both Human and non Human Rely on essential Elements that help to sustain the living of such creation water happen to be such one of such creation essential element that human and non human cannot survive without it. This because majority of the part of living things are composed of water and content of water either by consumption or other purpose need to be ascertained, the aim using water stand to be defeated of such water is not cleaner contains foreign materials. Water pollution is one key problem that effects the quality of water is today's life ways of preventing Water pollution water pollution and even remedying Already polluted water will gain a lot of commendation and attention.

Water
Water is the most important element in the biosphere, as it is very vital for life maintenance of all living things and also, it serves as a means of transportation for all nutrients that are involved in continuous existence of life (Singh, 2016). As rightly put by Schwartzed, 1997 "water is essential to life and less than three percent of earth total supply of water is fresh water, polar ice and inaccessible ground water make up more than half the three percent in developed western world, as well as The developing world, Water is Becoming more polluted Every year, Polluted water killed more than 24 million people in The developing World, Especially children"

Sources of water
As mention earlier, water is the most important thing to help both human and

animal, it plays a vital role in the Environment and it can be found from different sources as shown below;

(1)Surface water: These are water bodies that are collected on the ground, river, lake or ocean. These bodies of water are constantly recharged by means of precipitation, as it is also depleted through evaporation and seepage via other sources. Based on data from EPA, about 68% of water users in a given community get access from surface water such as lake. (United state geologist survey USGS resource on surface water).

(2)Ground water: These are water sources that are just beneath the surface of the earth, they are accessed by drilling some wells or pores and spaces within rocks. (USGS)

Pollution

Pollution can defined as the introduction of contaminants or other external substances into the environment which destabilizes the normal order and comfort of the environment. These substances which can either be naturally occurring or artificially made. (Thakur 2012). Pollution can also be defined as the accumulation of foreign substances, or other forms of energy occurring, in the environment in quantities that are beyond acceptable limit, or in case of liquid or gas, at rate that exceed the capacity which can be handled or neutralized by the ecosystem. (Dassmann 1975)

Types of pollution

In The surface of the earth pollution can be found in difference way and it is very dangerous to both human and animal health here are the different types of pollution and their sources are as follows.

a. Water pollution: According to the World Health organization (W.H.O., 1996), water pollution happens due to existence of foreign materials from natural or other sources which contaminate the with water supplies and may cause harm to life sources of water pollution, industrial effluents, industrial waste, sewage and agricultural discharges

b. Solid waste pollution : The term solid waste include such items as glass bottle, crockery's, plastic and polythene, Automobile spare parts , machine parts, which are discharge as garbage.(Geography spectrum)

c. Radioactive pollution: is the pollution occurs as result of nuclear explosion, beside the use of radioisotopes in medicine, industry and research.(Geography spectrum)

d. Noise pollution: Unwanted or Unpleasant sound that produces discomfort to human that causes health hazard(Geography spectrum)

Literature Survey

Water pollution is one of the most dangerous and hazardous pollutant that are released into the water as a result of disease, today most of the people from developing world suffer from water borne disease which is easily contacted by human being and animals. Many organization and scholars define water pollution in different ways (Report, 1965 define water pollution as alteration in physical, chemical and biological characteristic of water which may cause harmful effect on human and equality life. Water pollution is defined as natural or induced change in Quality of water which renders it unsuitable or dangerous as regard foods, Agriculture, fishing or leisure pursuits, (Vivier, 1958). The term water pollution refers to deterioration in chemical, physical and biological properties of water brought about by human activities and or by natural (e. g. hydrological) process which induce decomposed and vegetable materials and weathering products of rocks. (Southwick, 1976).

a) Sources of water pollution

Water is a substance that we found in everywhere and contaminant that are found in water either directly or indirectly is known as pollution and this water pollution can be found in different sources in an environment as given by many authors, sources of water pollution can be from two broad ways,

➤ **Point source pollution**: When pollution comes from a specific point or location into the water either from Sewage, leaking pipes or dirty water into rivers, such pollution is called point source pollution.

➤ **Non- Point source**: Another pollution source comes from large bodies of water than are run-off from farmland which contains pesticides, herbicides or fertilizers into water sources. Oily or salty location such as parking spaces, workshops and others can be washed by rainfall into wells that supply drinking water. Such sources that cover large areas is called Non –Point Source pollution (Thakur 2012)

b) Types of water pollution

Pollution gets into water from different ways and most types of the water pollution only affects the immediate area but sometimes it can travel hundreds or thousands of miles and then it is called trans-boundary pollution. Water pollution can be found in different types and each has its own way of polluting the water. Following are some types of water pollution that are illustrated by scholars;

i. Physical pollution: Physical pollution of water causes changes in water with regards to its colour, odour, taste, turbid nature and thermal properties etc the discharge from many industries is colored and such discharge may impart colour to water bodies such rivers, steam, ponds lake etc colour change is

not harmful unless it is associated with toxic chemical, but it may affect the quality of sunlight that penetrate to given depth inhibiting plant and animal metabolism. Turbidity in water arises mainly from colloidal matter and find suspended particle of soil erosion. Taste and odour change are produced by industrial excesses containing iron, free chlorine, phenols and microorganism odour pollution of water is caused both by chemical agents (such as hydrogen sulphide, chlorine, ammonia, phenols, alcohol, esters, hydrocarbons) and biological agent s such as algae and microorganisms etc) thermal pollution water is cause by discharge of utilized heat produced in various power plants. The heated waters have reduced amount of dissolved oxygen (DO) content due to which organic matter degrades faster. (Thakur 2012)

ii. Chemical pollution: The chemical pollution water is due to the presence of inorganic and organic chemicals such as acid, alkali, toxic, inorganic compound, dissolve organic pollutant can be biodegradable or non bio biodegradable. (Thakur 2012)

iii. Biological pollution: biological pollution of water happens due to the existence of bacteria, fungi, pathogens, viruses and some other parasitic worms etc. The important sources of bacteriological pollution are domestic sewage and industrial waste. Solid excreta from human bodies and decomposable organic matter of sewage are the best medium for development of bacteria in water. (Thakur 2012)

iv. Physiological pollution: These are caused by several chemical agents such as chlorine, sulphur-dioxide, hydrogen sulphide, ketones, phenols, amines and hydroxyl benzene cause physical pollution of water. (Thakur 2012)

c) Control of water pollution

When things are thrown into drainages or toilets are flushed, it is often forgotten that many Non-point sources of pollution are created. It seems easier to point fingers at agricultural, industrial and mining Operations as being causes of such pollutions. However, based on texts by scholars, control of water pollution requires several remedial measures involving individuals, community, and government at national and international levels. Ways to control such menace as given by these scholars include but not limited to;

1. Individuals must be educated enough to understand the nature of water pollution and its adverse effect on human health and wealth.
2. There must be mass awareness and correct perception at community level about various aspects of water pollution
3. People must restrain themselves from throwing human and animal excreta and garbage into any water bodies.
4. Industrial unit and Municipal Corporation must arrange for sewage treatment plant and treat polluted water before discharging effluents into lakes and rivers.
5. Individual communities, officials and owners of industries must tried in courts of law and suitably penalized under strict laws if they violet provisions of pollution Control (Singh 2016)

Methodology

For the purpose of this study, 200 structured questionnaires were distributed in four randomly selected locations (Abbaganaram, Limanti ward, Shehuri North and Shehuri South) of the study area. No criteria were used for the selection of respondents with respect to gender, background or whatsoever. Responses from these questionnaires were analysed using SPSS statistical package where, simple frequencies and cross-tabulations were run on the data to produce results. Results were further illustrated with pie charts.

Background of the Study Area

Maiduguri is the capital of Borno state and most populated settlement in North-Eastern Nigeria (1,197, 497) people on landmass (137, 35, sq KM)(NPC, 2010) located between latitude $11^0 46` 18$" N-$11^0$ 53 21"N, and longitude $13^0$ 02` 23" E-$13^0$ 14` 19E (Google Earth, 2012) its topography made of undulating plains of the Chad formation That lies at The mean level of 320m asl. With gradual sloping toward the Lake Chad level at 282m asl. These urban landform therefore are classified as plains and ridges comprising of paleolocutrian and flood plain with undulating terrain drained by River Ngadda into Ngadda delta popularly called the " Jere bowl " (Nyanganji 1996).

Results and discussion

This section tries to illustrate the result obtained in this research; simple frequencies and corresponding pie chart are shown in their order of responses and relevance.

Table 1: Location of Respondent.

Location	Frequency	Percent
Abbaganaram	47	25.1
Shehuri North	48	25.7
Shehuri South	46	24.6
Limanti	46	24.6
Total	187	100.0

From the above table, it can be seen the responded from the sample areas across the study area were evenly distributed. About twenty-five percent (25.7%) were from Abbaganaram ward of the study location, while about 25.1% were from Shehuri North. Both Shehuri south and Limanti ward had respondents of about 24.6%. This has clearly shown that the research had an even coverage and response which make it easy to generalize findings.

Table 2: Causes of Pollution in area.

Causes of Pollution	Frequency	Percent
Sewage	158	84.5
Drainage	24	12.8
Dump Site	4	2.1
Industries	1	.5
Total	187	100.0

The table above shows the major causes of water pollution in the area which are. it showed that sewage comprised about eighty four percentage(84%) of the causes, followed by drainage which had about twelve percentage(12%). Dumpsite which had about two percentages (2%) and industrial wastage which had percentage below 1% had minimal impact as causes of pollution.

Table 3: Water Pollution Frequency.

Pollution Frequency	Frequency	Percent
Always	176	94.1
Sometimes	8	4.3
Others	3	1.6
Total	187	100.0

From the above, it will be appreciated that water pollution is prevalent as about 94% had responded that their water is always polluted while a portion that is not very significant indicated that their water were either sometimes (4.3%) polluted or indifferent with stating others (1.6%)

Table 4: Water purification method.

Water Purification Method	Frequency	Percent
Traditional Method	137	73.3
Physical Method	38	20.3
No Idea	2	1.1
Others	10	5.3
Total	187	100.0

The above table shows the purification methods of water in the Maiduguri metropolis, the results show that majority of the respondents use traditional methods with about 73.3%, followed by the physical method which had about 20.3%. About 1.1 had no idea about how to even purify their water while others had about 5.3%.

Table 5: Sickness frequency.

Sickness Frequency	Frequency	Percent
Weekly	3	1.6
Monthly	146	78.1
Annually	22	11.8
Others	16	8.6
Total	187	100.0

Respondents in the study area fall sick frequently based on the percentage of people that fall sick monthly which is about 78.1%, followed by those who fall sick annually that make-up about 11% while others were indifferent having about 8%.

Table 6: Common Diseases in area.

Sickness	Frequency	Percent
Typhoid	58	31.0
Cholera	50	26.7
Diarrhea	19	10.2
Malaria	40	21.4
Hepatitis	2	1.1
Others	18	9.6
Total	187	100.0

Sickness that are prevalent in the area under review happen to be diseases that are water related, typhoid which had percentage of about 31%, Cholera with close to 27% and diarrhea with about 10% fall under this category. Other diseases like malaria with 21% and others are also seen to occur in the area under review.

Table 7: Water Pollution vs Sickness Frequency.

		How frequent do you fall sick?				
		Weekly	Monthly	Annually	Others	Total
How often is your water polluted	Always	3	146	22	5	176
	Sometimes	0	0	0	8	8
	Others	0	0	0	3	3
Total		3	146	22	16	187

A cross-tabulation between frequency of water pollution and the tendency of falling sick can be seen from the table above. Respondents who fall sick monthly and have their water polluted always make the highest number which is about 176 out of the 187 responded that gave their candid opinion.

Conclusion

Pollution is a menace and a cause of sicknesses to human beings. Sewages happen to be close to the readily available sources of portable drinking water in the study area. Methods of water purification and proper handling of water used for domestic purposes need to be made easy and understandable as it can be concluded from this research that majority of the population in Maiduguri Metropolitan Council Area use traditional method of purification which are not effective. Improvement in both water reticulation methods and pollution prevention strategies need to be put in place and there is a correlation between the frequencies in water pollution and the high level of sicknesses. Further research in this area should look at the knowledge and financial background of the population so as to ascertain the exact manner in which the pollution can be prevented and get in turn health quality is improved.

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