

EFFECTS OF WATER TURBIDITY ON HUMAN HEALTH A STUDY OF GBARAMATU KINGDOM IN WARRI SOUTH - WEST, DELTA STATE - NIGERIA

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ABSTRACT

T*his paper examines the effect of water turbidity on Human Health in Gbaramatu Kingdom. Turbidity in water is a measurement of how cloudy or murky a body of water is. It also measures the cloudiness of water and indicates water quality and filtration effectiveness. Turbidity is caused by particles of soil, organic matter, algae, metals, or similar matter suspended in the water column. These particles scatter light and make the water appear cloudy or murky. Secchi Disc (SD) is used to measure the amount of water turbidity. Bore-holes, sea and rain water are the major sources of water here. Higher turbidity level is often associated with higher level of diseases-causes micro-organisms such as viruses, parasites and some bacteria. These organisms can cause symptoms like vomiting, dizziness, skin rashes and lung irritation. Most of the diseases such as diarrhea, dysentery,*

Introduction:

Water is important for human life. Safe drinking water influences the quality of health and productivity. Life is originated in water and it is water that makes life possible. It is a known fact that human body consists of 60 to 70 % water. Water is available in large quantity in our blood, muscles, brain and lungs. The body use water to regulate its temperature and water acts as a base for all nutrients to travel all through the body. It transports oxygen to the cells effectively; remove the waste in the body and one other important act is in

cholera, and enteric fever prevail due to unsafe drinking water clubbed with the environmental factors. Many of the diseases caused by the human consumption of impure water are preventable if proper health and sanitation standards are enforced. Effort should be put in place by the Government to ensure the provision of treated, safe and quality drinking water such as drilling of bore-hall. Well and Bore-hall water which serve as the sources of water should be treated. Water Safety Plan (WSPs) should be used to monitor sources of water quality, the effectiveness of coagulation and clarification, filtration and disinfection performance in a water treatment plant, and the effectiveness of distribution system management.

Keyword: *Water, Turbidity, Human Health, Gbaramatu*

Protecting the organs. Water is thus an integral part of the body and without any doubt it must be consumed as per required proportion. Water makes up 60 per cent of body weight; blood plasma contains more than 90% of water, cell cytoplasm about 70 per cent of the bone has 20 per cent of water.

Turbidity is the measure of relative clarity of a liquid. It is an optical characteristic of water and is a measurement of the amount of light that is scattered by materials in the water when a light is shone through the water sample. The higher the intensity of scattered light, the higher the turbidity. Material that causes water to be turbid include clay, silt, very tiny inorganic and organic matter, algae, dissolved colored organic compounds, and plankton and other microscopic organisms. Turbidity makes water cloudy or opaque. Turbidity is an extremely useful indicator that can yield valuable information quickly, relatively cheaply and on an ongoing basis. Measurement of turbidity is applicable in a variety of settings, from low-resource small systems all the way through to large and sophisticated water treatment plants.

Turbidity, which is caused by suspended chemical and biological particles, can have both water safety and aesthetic implications for drinking-water supplies. Turbidity itself does not always represent a direct risk to public

health; however, it can indicate the presence of pathogenic microorganisms and be an effective indicator of hazardous events throughout the water supply system, from catchment to point of use. For example, high turbidity in source waters can harbor microbial pathogens, which can be attached to particles and impair disinfection; high turbidity in filtered water can indicate poor removal of pathogens; and an increase in turbidity in distribution systems can indicate sloughing of biofilms and oxide scales.

Turbidity can be easily, accurately and rapidly measured, and is commonly used for operational monitoring of control measures included in Water Safety Plans (WSPs), the recommended approach to managing drinking-water quality in the WHO Guidelines for Drinking-water Quality (WHO, 2017). It can be used as a basis for choosing between alternative source waters and for assessing the performance of several control measures, including coagulation and clarification, filtration, disinfection and management of distribution systems. Turbidity is an important and versatile operational parameter that supports water quality management from catchment to consumer. It can be used to monitor source water quality, the effectiveness of coagulation and clarification, filtration and disinfection performance in a water treatment plant, and the effectiveness of distribution system management.

Turbidity can be used to monitor source water quality. Rapid changes in turbidity can be an indication of substantial pollution events in surface water and groundwater catchments (e.g. triggered by storms, thaws, fires or spills, which may be coupled with anthropogenic activities such as clearing of forests), or ingress of contamination through groundwater infrastructure. Turbidity changes over intervals that are longer than historical results may indicate changes in the catchment that require attention. Changes in turbidity should be investigated to determine causes and to identify appropriate corrective actions. Turbidity in surface waters tends to be more variable than in groundwater, and regular turbidity measurements of surface source waters can be used to adjust treatment and disinfection processes (e.g. adjustment of coagulant and disinfectant

doses), intake depth management (e.g. in reservoirs and river intakes), and diversion or avoidance of raw water successively remove turbidity when operated properly.

WATER

Water is vital for our body just like the earth; the average adult contains 40 to 50 quarts of water. The water in our body must be reserved every 10-15 days. With the intake of food such as fruits and vegetables, we are receiving water but we still need to drink at least 6 glasses of water daily to enable our body to function properly. Water is the base for all body functions. Water is essential to sustain life, and a satisfactory supply must be made available to consumers. One of the major problems of drinking water is that, water is not safe. The health problem associated with unclean water is enormous. Out of the 3.4 million people killed each year by water-related diseases, 2.1 million are mostly children who die from diarrhea disease, stemming from lack of access to safe water, inadequate sanitation and poor hygienic (WHO, 2017).

The quality of drinking water is powerful environment for human health. Assurance of drinking water safety is a foundation for the prevention and control of water borne diseases. Water which is essential for life, growth and health can also be a source of spread of disease and cause of ill-health, if contaminated or improperly handled and stored. Safe drinking water plays a major role in the overall well-being of the people, with a significant bearing on infant mortality rate, longevity and productivity (Economic Survey, 2013-14). The diseases which are spread through the microbial contamination of water are those caused by enteric bacteria such as cholera, acute gastroenteritis, diarrhea, dysentery, typhoid, viral hepatitis A and E and Poliomyelitis. In fact, Gbaramatu Kingdom is fast approaching a phase of extremely stressed water availability condition. This also affects quality of water with serious adverse effect on the health of the people.

There is no doubt that water and sustainable development are ineradicably linked. Today water defines human, social and economic development. Without adequate supplies and management of fresh and safe water

resources, socio-economic development simply cannot take place. Water is said to be contaminated when it contains infective and parasitic agents, poisonous chemical substance, industrial or other waste or sewerage. Human health is dependent on wholesome and reliable supply of water and safe sanitation. Today, there is no place where safe drinking water is available. Various types of contaminants are dissolved in the water. When these contaminants are in extremely high quantity, it causes many waterborne diseases which can spread at very fast rate.

GBARAMATU KINGDOM

GBARAMATU Kingdom is in Warri South West Local Government Area of Delta State, Nigeria. Gbaramatu Kingdom is one of the prominent Kingdoms among the Ijaw people in the Niger Delta of Southern Nigeria. Gbaramatu Kingdom is a major contributor to the economy of the nation. The ancient town of Ujo-Gbaran or Gbaran for short was founded by Gbaran, an elder son of Ujo. Gbaran was given the scepter of Ujo on the death of his father. Later, his descendants went and founded the town of Oporo-aja (Oproza) in the western delta region of Escravos, giving birth to the Gbaramatu and Arogbo in Ondo area. From Oproza town in Gbaramatu clan was founded at the end of the 15th century, Kabo, Kumbo and Gbaran clans, which was the result of a large family migration from Oporoza town about 1480. From Kumbo was founded Okparabe. From Gbaran town in central Izon, was founded Effurun and Uvwie. Efferun a descendant of Gbaran, elder son of Ujo, was the ancestor of the Effurun in upper Warri area, while Owei was the ancestor of the Uvwei. Likewise, from Gbaran was founded via Effurun, the Tuomo clan. From Oporoma was founded the Operemo clan, and some went to join the Ogbos, descendants of Kala-Ogbo to become the Ogbe-Ijo clan.

Major communities in Gbaramatu Kingdom are: Okerenkoko, Kurutie, Kunukunuma, Ibaflagba, Inikoragha, Azama, Oporaza, Jala, Opodebuebor, Teibuyor, Igoba, Ikantu, Kokodiagbene, Benikrukru, Abitieye, Batan, Egwa 1, Egwa 2, Pepe-Ama, Seitorububor, Opode – Bolobu, and Olu-Kperebu.

DISSOLVE CHEMICALS IN DRINKING WATER AND IMPACT ON HUMAN HEALTH

Parameter	Maximum permissible limit	Health Impact
Fluoride	1.5 mg/l	Immediate symptoms include digestive disorders skin diseases, dental fluorosis
Arsenic	0.05 mg/l	Immediate symptoms of acute poisoning typically include vomiting, esophageal and abdominal pain and bloody 'rice water' diarrhea. Long term exposure to arsenic causes cancer of the skin, lungs urinary bladder and kidney.
Iron	1 mg/l	A dose of 1500 mg/l has poisoning effect on a child as it can damage blood tissue. Digestive disorders, skin diseases and dental problems.
Nitrate	100 mg/l	Causes methamoglobinemia i.e. where the skin becomes blue due to decreased efficiency of haemoglobin to combine with oxygen. It may also increase risk of cancer.
Salinity	2000 mg/l	Objectionable taste to water. May affect osmotic flow and movement of fluids.
Heavy metals	Cadmium-0.01 mg/l Zinc-15 mg/l mercury 0.001 mg/l	Cause damage to nervous system, kidney and other metallic disruptions.
Persistent organic pollutants	None	High blood pressure, hormonal dysfunction and growth retardation

HEALTH EFFECTS

Poor water quality continues to pose a major threat to human health. Drinking water must be free from chemical substances and microorganisms, which might be dangerous to the health of the user. The water from wells, bore-holes, rain water, ponds, and rivers are sometimes contaminated with organic matter which makes the water unhygienic and unfit for human consumption. The level of contaminates available in drinking water could be high enough to cause acute (immediate) health effects. Examples of acute health effects are seasickness, lung irritation,

skin rash, vomiting, dizziness, and these disease contaminants are likely to cause chronic health effects that occur long after repeated exposure to small amounts of harmful chemicals. Examples of chronic health effects include cancer, liver and kidney damage, disorder of nervous system, damage to the immune system and birth defects such still births, low infant weights or even still births.

There are many different diseases that can be caught from dirty water.

- 1. Cholera:** Cholera is an acute water borne disease caused by the bacterium scientifically known as *Vibrio cholera*. Cholera may develop through the consumption of contaminated water.
- 2. Diarrhea:** It is also a symptom of water borne diseases. It often results to frequent discharge of watery feces from the bowels. Generally, diarrhea may occur for a short time, usually from two or three days but may also linger for longer period depending on the intensity of infection or frequency of recurrence. Diarrhea is largely caused by poor and unhealthy sanitary condition and is more common in the under developed world with poor sources of drinking water.
- 3. Hepatitis:** Hepatitis is a disease that affects the human liver. It is an inflammation of the liver. Two of the major viruses that causes hepatitis have been identified by medical scientists as hepatitis A and C. These two viruses are often transmitted through drinking infected water but it could also be transmitted through food.
- 4. Dysentery:** General symptoms of this type of disease are frequent passage of faces with blood and mucus and in some cases vomiting of blood.

WATER AND DISEASES

Water is a gift of nature. The total amount of water on the earth is finite while man's capacity for pollution is accelerating due to the growth of the human population, agriculture and industries across the globe. Local water bodies may very quickly be exhausted and become polluted due to greed and ignorance, Water can become a source of death and diseases rather than life as we may have already been aware. Most of the communities' discharge 80-90% of the sewage directly into rivers and streams which are used for drinking, bathing and washing. The growing pollution of rivers constitutes the biggest threat to the public health. Polluted waters lead to various gastrointestinal problems, liver infections, cancer etc.

The following are ways in which diseases may be carried out by water.

- Pathogenic organisms are transmitted from one person to another through domestic water supply, e.g. cholera, typhoid and hepatitis.
- Inadequate water supply, lack of personal cleanliness, i.e. skin infection.
- Infection transmitted by organisms which live in water, e.g. helminths that spread parts of their life cycle in water.
- Insect vectors which are related in some way to water transmit infection, e.g. yellow fever, malaria etc.

HOW TURBIDITY AFFECTS WATER

Turbidity affects the growth rate of algae (micro-aquatic plants) and other aquatic plants in rivers, streams and lakes because increased turbidity causes a decrease in the amount of light for photosynthesis. Turbidity can also increase water temperature because suspended particles absorb more heat, these factor leads to the decrease in dissolved oxygen. Turbidity can affect how aquatic life can see or function underwater. Excessive turbidity is known to clog the gills of fish, interfere with their ability to find food, and bury bottom dwelling creatures and eggs.

MEASUREMENT OF TURBIDITY

Turbidity is affected by several factors in water: presence of dissolved and suspended solids, sizes and shapes of particles and the composition of the particles. Water quality measurements that can help in the characterization of turbidity include total suspended solids, volatile suspended solids, total dissolved solids, suspended sediment concentration, chlorophyll and particle size analysis. Other factors such as flow, sediment source and composition, algal species and sediment transport characteristics can also provide important information in characterizing the turbidity present in water. The Secchi Disc (SD) is the instrument used to measure the amount of water turbidity.

CAUSES OF WATER TURBIDITY

Turbidity is highly caused by particles of soil, organic matter, algae, metals, or similar matter suspended in the water column. These particles scatter light and make the water appear cloudy or murky. Sediment often tops the list of substances or pollutants causing turbidity. However, any watershed has multiple sources of the pollutants or physical features that can affect

water clarity. These can be divided into natural or background, and human induced sources. Natural sources can include erosion from upland, riparian, stream bank, and stream channel areas; however, this is difficult to measure due to agricultural and developmental activities. Human activities can accelerate erosion. Tannic acids often associated with peat and bog areas cause water to be colored resulting in turbidity. Algae that grow with nourishment from nutrients entering the stream through leaf decomposition or other naturally occurring decomposition processes can also be a source of turbidity. Stream channel movement can also release sediment.

EFFECT OF WATER TURBIDITY ON HUMAN HEALTH

There is a great association between pollution and health problem. Disease causing micro-organisms are known as pathogens and these pathogens spread diseases directly among humans. Some pathogens are known worldwide, some are found in specific areas. Health risks associated with polluted water include different diseases such as respiratory disease, cancer, diarrheal disease, neurological disorder and cardiovascular disease. Poor people are at greater risks of diseases due to improper sanitation, hygiene and water supply. Contaminated water has immense negative effects on women who are exposed to chemicals during pregnancy; it leads to the increased rate of low birth weight thus fetal health is affected. Poor quality water destroys the crop production and infects food which is hazardous for aquatic as well as human life. Pollutants disturb the food chain with heavy metals, especially iron which affects the respiratory system of fishes. When iron clogs in fish gills, it is lethal and when these fishes are eaten by human, it leads to a major health issue. Metal contaminated water leads to hair loss, liver cirrhosis, renal failure and neural disorder.

RECOMMENDATIONS

- Effort should be put in place by the Government to ensure the provision of safe and quality drinking water.
- Wells and Bore-holes which serve as the sources of water should be attached with treatment plants.
- Hospitals should be constructed across the communities.
- The communities should be provided with facilities for disposing sewages, metals and other waste materials.

CONCLUSION

Turbidity is an important and versatile operational parameter that should be included in Water Safety Plan (WSPs) to support water quality management from catchment to consumer. It can be used to monitor quality of water sources, the effectiveness of coagulation and clarification, filtration and disinfection performance in a water treatment plant, and the effectiveness of distribution system management. At the household level, it can also be used to assess the appearance and acceptability of drinking-water supplied to consumers as well as the effectiveness of household water treatment and safe storage.

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