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# Water pollution and its impact on human health in Nigeria

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## Abstract

**Background:** Water pollution is a significant environmental and public health issue in Nigeria, affecting millions of people due to inadequate sanitation, industrial discharge, agricultural runoff, and oil spills. Contaminated water sources contribute to the spread of diseases such as cholera, typhoid, and dysentery, posing severe risks to human health. This study examines the causes, effects, and potential solutions to water pollution in Nigeria, emphasizing the need for improved policies, infrastructure, and community engagement.

**Methods and Materials:** This research employs a mixed-methods approach, combining data from scientific literature, government reports, and environmental monitoring agencies. Primary data sources include WHO, Nigerian environmental agencies, and peer-reviewed journals. Case studies of successful water pollution mitigation projects in Nigeria, such as community-led initiatives and government interventions, are analyzed to assess their effectiveness in addressing contamination and improving water quality.

**Results:** Findings indicate that Nigeria's water pollution stems from industrial waste, oil spills, improper waste disposal, and agricultural chemicals. Heavy metals, pathogens, and microplastics significantly affect water quality, leading to increased waterborne diseases and long-term health complications, including cancer and neurological disorders. Additionally, poor sanitation infrastructure and rapid urbanization exacerbate contamination. Effective mitigation strategies include stricter regulations, wastewater treatment improvements, and public awareness campaigns.

**Conclusion:** Addressing water pollution in Nigeria requires a multi-faceted approach involving government policies, technological advancements in water treatment, and active community participation. Strengthening environmental laws, investing in sustainable water management systems, and promoting education on pollution prevention are crucial for safeguarding public health and ensuring clean water access. Future research should focus on long-term water quality monitoring and innovative pollution control technologies.

**Keywords:** Water pollution, Public health, Nigeria, Environmental management, Waterborne diseases

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## 1. Water pollution and its impact on human health in Nigeria

### 1.1 Introduction

In Nigeria, the water supply and sanitation region is regulated across the areas with the aid of various governments at the federal level via the usage of state laws and local government institutions. The Federal Ministry of Water Assets is responsible for policy components, coordination, and steerage. National health policy on water and sanitation is overseen with the aid of diverse businesses, including the Federal Ministry of Health and the Ministry of Planning, Research, and Statistics. However, in exercise, a maximum of the 36 states have ministries of water sources or rural water and agricultural development ministries. They support water supply in urban and rural areas through their facilities. Municipal water supply is regulated with state aid, with water zone businesses and the Rivers State Water Company and Lagos Water Company imparting water to human beings through rivers and dams. However, rural water delivery is furnished by non-public and community assets and with the aid of federal and state governments. Therefore, city water supply to areas comes from groundwater from boreholes. Thus, water sources in urban communities in Nigeria may be exposed to extraordinary environmental conditions. Currently, most residents depend on many streams and rivers for each day's necessities and different requirements whilst washing, even though those facilities may be seasonal due to elements which include climate trade, poor pollutants, waste management structures, agricultural runoff because of terrible sanitation, etc.

Private software offerings broaden and perform the service. Despite the availability of finances, the value of water supply and sanitation in rural regions is also low compared to other instances. Water pollution is the addition of materials or forms of strength to a body of water and the alteration of its homes. Water pollution is adding substances or forms of energy to water bodies and changing their properties. This directly or indirectly affects legal applications (Eckenfelder et al., 2000; WHO et al., 2017; Olaniran et al., 1995; Moss et al., 2008; Oliveira et al., 2021). Pollution is, therefore, related to human perception, such as harmful changes in water sources. Application: If the water is contaminated with artificial pollutants, It is called contaminated water. They cannot be used for human purposes such as drinking water or maintaining a healthy population of aquatic animals, and other living things are significantly reduced by these pollutants.

### 1.2 Definition of water pollution

Water pollution means water from rivers, lakes, oceans, and underground sources gets dirty or spoiled due to dangerous substances, germs, and pollutants. This issue can happen because of different things people do and also due to natural events, and these activities can release harmful or undesirable materials into the water.

### 1.3 Understanding water pollution

### Understanding Water Pollution

Water is considered dirty when it has things that stop it from being used for specific jobs. According to Olaniran and others in 1995, water pollution means too many harmful water materials, making it unsuitable for baths, cooking, drinking, or other uses. When toxic substances are let into the environment, it is known as pollution, as stated by Webster in 2010. Waste from industries and businesses contributes to this problem. It comes from farming, regular human activities, and especially from transportation. No matter where you are or what you do, you typically find traces left behind by nature and living things. This research looks into the issue of water pollution and how to manage it.

Water pollution is a significant environmental issue that impacts nature. It affects both people's health and the availability of clean water. This happens when dangerous materials dirty water sources, making it unsafe to drink, swim, or use for other purposes. In this section, we will look at important aspects of water pollution, where it comes from, its effects, and possible ways to fix it.

### 2. Sources of water pollution

According to (Gbamanija et al., 1998), water pollution in Nigeria is due to several factors such as sewage discharge, high population density, oil spills, the dangers of Nipah

finger and water hyacinth, industrial waste dumped in waterways

groundwater pollution due to drilling activities, rainy season floods that wash

waste deposits into waterways, construction and foresight of latrines

water flowing through some of the surrounding rivers and even the sea. Radioactive isotopes, heavy metals, burning of, dumping of contaminated waste into the ocean, sediment erosion. (e.g., coal mining), mineral processing crops, deforestation, mining, waste, pesticides, herbicides and fertilizers, damage to septic tanks, household chemicals, and Animal feces.

The leading cause of water pollution is humans. It is a product of human actions used for self-improvement. They can be considered part of the various human actions that cause pollutants. The leading causes of infectious diseases are population growth and industrial and agricultural interest (Eguabor et al., 1998). Environmental pollution is increasing as a result of urbanization. The primary sources of pollution in human habitats are agricultural, domestic, and commercial waste. Pouring wastewater into carbonated water is the most significant pollutant. Sewage is a waste of water in society, and the amount of untreated water discharged into rivers is enormous and dangerous. As a result, the amount of oxygen dissolved in the water decreases rapidly. It is

worth noting that decomposers, the bacteria that break down suspended compounds in wastewater, require natural fertilizers. Decomposers consume dissolved oxygen (O2) as they respire, reducing biological oxygen demand. River plants and wildlife aThis figure goes up and down and decreases because of lack of oxygen (Tudge et al., 1991). Dirty rivers smell bad and have very few plants or animals. Wastewater from the company's cooling engines is another type of water pollution. Lowering the water temperature slows down the growth and function of living things. This means that there is more need for oxygen. Pollution significantly affects areas with shallow water, stagnant water, or slow-moving water. There is an overuse of fertilizers, pesticides, and herbicides; fertilizers with excess phosphorus create more chaos. In addition to fertilizers, soaps can be very harmful to ocean creatures when they mix with water. Carcinogens from animals have been detected. There is also chemical pollution from vehicle exhaust. When the dye industry in Nigeria releases non-biodegradable chemicals like ZnSO4 into rivers, it negatively impacts the homes of sea life. Pollution is dangerous to human health, mainly when these waters are used for drinking and household tasks.

Germs such as cholera, typhoid, and tuberculosis, along with large oil spills from ships and damage to oil pipes, are significant sources of water pollution that harm shellfish, marine plants, crabs, fish, seabirds, and other ocean animals that people consume. Consequently, our diets lack calcium. Certain pesticides, like dichlorodiphenyltrichloroethane, lead to higher concentrations in water bodies, making it very harmful as it moves up the food chain. For instance, dichlorodiphenyltrichloroethane can collect in oysters at levels 70,000 times higher than in seawater. Water pollution has caused permanent changes to aquatic habitats in some places. Humans, plants, and animals are all in danger. Because of water pollution, effective teaching methods can enhance understanding and foster positive attitudes towards water. Therefore, the guided discovery approach is a teaching style that can have lasting benefits for learners when applied correctly and combined with other science education methods. This also helps students address environmental challenges (Ogwuasor et al., 1998).

Water pollution originates from both point and non-point sources:

**2.1. Point source**

**Industrial waste:**

Factories often discharge pollutants directly into waterways without proper treatment, contaminating heavy metals, chemicals, and toxic substances.

**Wastewater treatment plant:**

If wastewater is not adequately treated, pathogens, nutrients, and pharmaceuticals can enter the environment. Drains and sewerage:

The flow of rainwater can carry contaminants directly from river and lake cities.

### 2.2. Non-point sources

**Agricultural activity:**

Using fertilizers, pesticides, and herbicides can cause nutrients to enter nearby water areas, cause eutrophication, and damage the water life. City runoff:

Rainwater flows in rainwater from the streets and surfaces of pollutants (such as oil, fat, and plastic) on roads and surfaces and then flows into the local waterway.

**Earth development:**

Urbanization will destroy the natural sewerage regime and increase the runoff, which will cause water canal erosion and precipitation and destroy the water habitat.

### 2.3. Other sources

**Mining activities:**

When minerals are extracted from the ground, it could cause dangerous metals to combine into close-water reasserts and boom sediment buildup.

**Marine activities:**

Transporting items and drilling for oil can cause leaks and unauthorized releases that create oil spills and introduce dangerous chemical substances into the water.

**Atmospheric deposition:**

Harmful materials inside the air, like mercury from burning coal, can fall into water and increase in fish.

## 3. Effects of water pollution

Toxic waste in water has a twofold effect on nature: it harms people and the environment. Pollution affects individuals in various ways and aquatic habitats. Each day, approximately 14,000 individuals lose their lives due to dirty water. This primarily results from untreated sewage polluting drinking supplies in poorer nations. Around 700 million residents of India lack access to adequate sanitation facilities. Every day, 1,000 children perish from diarrhea, and this occurs in many other places too. Close to 500 million people in China do not have clean drinking water.

There is a strong likelihood of reduced productivity. When large quantities of dangerous substances are released into rivers, lakes, and oceans, the variety of life in species and communities is negatively impacted. Wastewater, which mainly consists of organic materials, harms most aquatic life. This situation could potentially increase secondary productivity while altering the aquatic community's nature. Many fish, particularly those sought after for food, are among the most threatened, so even a little pollution can drive them to extinction. Contaminated water is a risk to human health.

Pathogenic germs and viruses enter the body from polluted water sources. Drinking tainted water risks people's well-being. Direct harm to the nutrition of plants and animals impacts human health, too. An excessive presence of nutrients for plants like nitrogen and phosphorus that promote aquatic plant growth can result in algae blooms and the overgrowth of weeds. This can change the smell, taste, and color of the water. Ultimately, this disturbs the ecological balance of the water. Emissions of sulfur and carbon dioxide lead to the acidification of oceans. Carbon dioxide further decreases the pH levels of Earth's oceans, while emissions contribute to acid rain and reduce soil pH.

Water pollution has a wide array of detrimental effects on the environment and human health:

### 3.1. Environmental impact

**Destruction of ecosystems:**

Dirty water can kill fish and other water creatures, reduce the variety of living things, and disturb food webs.

**Eutrophication:**

Too many nutrients from farming runoffs can trigger algae growth, which reduces oxygen in the water and forms areas where fish and other sea life can't live.

**Habitat destruction:**

Mud and pollution can ruin important places where animals live, like areas where fish lay eggs and marshlands.

### 3.2. Human health risks

**Waterborne diseases:**

Bacteria in wastewater can cause diseases such as cholera, typhoid, and red gut.

**Exposure to toxins:**

Chemicals such as heavy metals (lead, mercury), pesticides, and industrial pollutants can accumulate in the food chain and cause serious health risks such as cancer, neurological disorders, and reproductive system problems...

**Financial costs:**

Water pollution affects sectors that depend on water, such as fishing and tourism. This leads to economic losses

**4. Solutions to water pollution**

**Management and supervision of environmental pollution**

Various methods exist to manage and keep track of water usage and harmful waste. This involves avoiding, setting up, or getting involved in different plans or projects. There are also rules and measures for monitoring and controlling things like cutting down waste and minimizing potential harm. According to information from Wikipedia, there are numerous ways to prevent water pollution:

• When washing your car, be as far from storm drains as possible.

• Never dump trash, chemicals, or solvents down the drains.

• Check your septic tank every three and a half years.

• Stay away from using chemical fertilizers and pesticides that could spoil water sources.

• Instead of using a hose to clean your driveway, sweep it.

• Make sure your boat's wastewater is managed correctly.

• Choose cleaning products that are safe for the environment.

• Clean up oil and other liquids with cat litter and dispose of them correctly.

• Don't use the sink to wash your brushes.

**Ways to get involved**

To help stop pollution, you can either act independently or join a program or an Environmental Protection Agency (EPA) initiative that might operate in your area. Pollution can be managed effectively through specific actions. Many nations have laws to control various types of pollution and lessen their harmful impacts. Pollution prevention focuses on controlling emissions and

runoff in the air, water, land, or soil caused by food production, transportation, industrial processes, mining, farming, heating, and other human actions.

When pollution builds up or spreads, it can harm the environment if we don't take steps to prevent it. To avoid pollution and minimize waste, pollution management involves composting, reducing impacts, recycling, decreasing waste, reusing materials, and avoiding unnecessary waste. In addition to these prevention methods, there are tools like dust collectors and scrubbers, including impact spray scrubbers, ejector valve scrubbers, mechanical scrubbers, spray towers, wet scrubbers, and wastewater treatment systems like primary settling and activated sludge biofilters used in secondary treatment, which are also applicable for treating industrial wastewater.

To address water pollution, a multi-faceted approach is required:

### 4.1. Regulation and policy

Enforcement of Environmental Regulations: Governments must enforce laws regarding waste disposal, effluent treatment, and pollution limits for industries.

Sustainable Agricultural Practices: Promote organic farming, integrated pest management, and sustainable fertilizer usage to reduce runoff.

### 4.2 Result and discussion

**Effects of water pollution on humans**

Water pollution can negatively affect humans, fish, and plants in the water. Pollutants in water can enter the human body and cause various water pollution-related diseases. We can help tackle water pollution through environmental education. In 2017, Haseena and others found that dirty water can transmit diseases caused by microorganisms, viruses, and parasites, such as typhoid fever, diarrhea, dengue fever, tetanus, hepatitis, skin problems, and stomach problems. To protect human health, it is essential to test water quality regularly. Domestic and agricultural waste must be treated before disposal. Sanghera et al. (2018) emphasized the need for further measures to reduce or avoid human exposure to pollutants altogether. It is necessary to study the side effects of pesticides to further human health on human health.

### 4.3 Water contamination

Water contamination can affect life and health. You can control water pollution through environmental education.

Owa and his team started working in 2013 to explain the water pollution. They made suggestions such as implementing environmental education. China should conduct scientific research on pollution monitoring, waste disposal, vegetation restoration, and improving water treatment

technologies within the next 5 to 15 years. These efforts are designed to prevent and control lake and river pollution, improve overall water quality, and ensure a safe drinking water supply. Such plans will provide scientific evidence and technical support to increase Chinese water quality to the highest level.

### 4.4 Treatment and technology

Improved Wastewater Treatment: Investing in advanced treatment technologies can help reduce pollutants released into water bodies.

Stormwater Management: Implementing green infrastructure such as rain gardens, permeable pavements, and retention basins can mitigate urban runoff.

### 4.5 Public awareness and community engagement

Education Campaigns: Raising awareness about water conservation and pollution prevention can encourage individuals and communities to take proactive measures.

Community Clean-Up Activities: Organizing river and beach clean-ups can help improve local water quality and engage the community in environmental stewardship.

## 5. Water pollution in Nigeria

Water Pollution in Nigeria

Water pollution is a significant environmental issue in Nigeria, with profound implications for public health, ecosystem sustainability, and economic development. Various factors contribute to water quality degradation across the country, particularly in urban areas and regions with substantial industrial and agricultural activities.

### 5.1 Major pollutants in Nigerian water bodies

- **Grease**

Origin: The oil and gas sector, especially in the Niger Delta area, creates a lot of oil pollution because of regular oil spills, leaks, and illegal oil theft.

Effect: Oil spills dirty water supplies, harm fish and natural habitats, and create serious health risks for communities that rely on these waters for drinking and fishing.

- **Heavy Metals**

Common Heavy Metals: Lead, mercury, cadmium, arsenic, and chromium are typical pollutants.

Sources: Industrial waste, mining operations, and runoff from cities.

Effect: These metals can harm human health, leading to problems like brain damage and other long-term illnesses while also building up in fish and affecting the food chain.

- **Nutrients (Nitrogen and Phosphorus)**

Sources: Farm runoff includes chemical fertilizers, pesticides, raw sewage, and wastewater.

Effect: Too many nutrients in water can cause problems like eutrophication, which leads to dangerous algae growth and lower oxygen in the water, harming fish and other aquatic species.

- **Pathogens**

Common Pathogens: Bacteria like E. coli, viruses, and local animals can cause infections in water.

Sources: Untreated wastewater, farm runoff, and watering livestock.

Effect: These pathogens can lead to severe health issues, such as diarrhea, cholera, typhoid, and other diseases, particularly affecting those who are vulnerable.

- **Suspended Solids**

Source: Soil erosion, construction activities, and runoff from cities and mines.

Effect: High amounts of suspended solids can reduce light in water, harm aquatic plants, and destroy habitats. They might also carry other pollutants and harmful microorganisms.

- **Pharmaceuticals and Personal Care Products**

Source: Runoff contains medications, wastewater with leftover medicine, and wrong medical waste disposal.

Effect: These pollutants can build up and harm aquatic life, disrupting their ecosystems and posing risks to human health.

- **Microplastics**

Source: Runoff from cities, poor waste management, and plastic litter.

Effect: Microplastics can pick up harmful chemicals and move through the food chain, potentially posing health risks to fish and humans who eat contaminated seafood.

- **Industrial Chemicals**

Type: Different substances like solvents, dyes, and toxic wastewater from factories.

Source: Industrial discharges and inadequate waste disposal methods.

Effect: These chemicals are harmful to aquatic creatures, can upset ecosystems, and pollute drinking water sources.

### 5.2 Waterborne diseases in Nigeria

**Cholera**

Caused by Vibrio cholerae, often found in fecal-contaminated water.

Symptoms: Severe diarrhea, vomiting, rapid dehydration, and, in some cases, death if left untreated. Impact: The choice epidemic usually occurs in the rainy season, especially in poor communities or hygienic places. It quickly spreads, causing serious health threats to the public. typhoid fever

Causes: Salmonella typhi, spread through food and water contaminated with feces.

Symptoms: persistent fever, abdominal pain, fatigue, loss of appetite, and headache. In severe cases, it can cause intestinal perforation and internal bleeding.

Impact: Typhoid is a common health problem in Nigeria, affecting many people, and it tends to hit children and adolescents harder, resulting in high medical costs.

**Dysentery**

Types: Bacillary dysentery (caused by bacteria such as Shigella) and amoebic dysentery (caused by the parasite Entamoeba histolytica) are two key varieties.

Symptoms: Intense diarrhea that includes blood and mucus, stomach cramps, fever, and loss of fluids. Impact: Dysentery is common in Nigeria, especially in crowded urban and rural communities without adequate sanitation, causing serious health problems.

**Hepatitis** A

Cause: Hepatitis A virus is spread by eating or drinking contaminated food and water.
Symptoms: Fatigue, nausea, abdominal pain, loss of appetite, yellowing of the skin and eyes (jaundice).

Effects: Hepatitis A can cause serious illness and liver damage, especially in vulnerable groups such as children and the elderly. Jia Diasis

What caused: Jia di Whip Caterpillar parasites were found in dirty drinking water.

Symptoms: Diarrhea, abdominal cramps, bloating and nausea. Some people may not have any symptoms at all.

Impact: Giardiasis is common in Nigeria and can cause malnutrition and slow growth in children due to prolonged diarrhea. Schistosomiasis (Bilharzia)

Cause: Parasitic worms from the Schistosoma group are transmitted when people come into contact with contaminated water, often in rivers and lakes.

Symptoms: Long-term infections can cause abdominal pain, diarrhea, and blood in the urine or stool, as well as damage to organs such as the liver and bladder. Impact: Schistosomiasis is widespread in Nigeria, affecting large numbers of people, mainly in rural areas close to water sources, and can cause serious long-term health problems.

**Trachoma**

Cause: The bacterium Chlamydia trachomatis is more associated with hygiene and eye infections than with water pollution. Impact: Trachoma can cause blindness and is more common in regions where people do not have enough clean water for washing and sanitation.

**Malaria (Indirectly)**

Caused by: Plasmodium species carried by malaria mosquitoes, which breed in stagnant water that is often dirty. Effect: Although malaria is not caused by contaminated water, poverty-increased water management provides more cultivation sites for mosquitoes that help distribute malaria.

**Coefficient**

Nigerian water transmission high disease reasons:

Insufficient water supply: Many people cannot enter safe drinking water sources in cities and rural areas. Poor sanitation and hygiene: The absence of appropriate sanitation and poor hygiene practices helps to spread bacteria.

Population density: Many people in crowded neighborhoods increase the possibility of outbreaks. Inadequate public health infrastructure: Limited health services and resources make it challenging to diagnose and treat waterborne diseases quickly.

**5.3 Chronic health effects of water pollution**

Chronic health issues resulting from water pollution are ongoing health concerns that arise from extended contact with dirty water. This contact can happen due to various harmful substances, like heavy metals, pesticides, industrial chemicals, and germs. These long-lasting health issues can significantly affect people, neighborhoods, and healthcare systems. Below are some key chronic health problems related to water pollution:

**Cancer**

Possible Causes: Contact with cancer-causing substances in dirty water, such as arsenic, benzene, and pesticides.

Health Effects: Being exposed for a long time raises the chances of developing different kinds of cancer, including skin, bladder, lung, and liver cancer.

**Nervous system damage**

Possible Causes: Heavy metals like lead, mercury, cadmium, and some organic chemicals can harm the nervous system.

Health Effects: Long-term exposure may lead to problems with thinking and learning in children, and it can raise the risk of diseases that affect the brain, such as Alzheimer's and Parkinson's.

**Reproductive and developmental problems**

Possible Causes: Chemicals that disrupt hormones and heavy metals can harm reproductive health and the development of babies.

Health Effects: These exposures can lead to issues like infertility, irregular periods, birth defects, low birth weight, and developmental delays in children.

**Weakened immune system**

Possible Causes: Long-lasting exposure to pollutants like heavy metals and organic substances can weaken the body's ability to fight diseases.

Health Effects: People affected may be more likely to get infections, experience long-term inflammation, and have a higher chance of autoimmune diseases.

**Respiratory problems**

Possible Causes: Harmful substances, including volatile organic compounds and fine dust, can reach the lungs through air or contaminated water.

Health Effects: Prolonged exposure can lead to breathing issues like asthma.

## 6. Case Study of a successful water pollution mitigation project in Nigeria

Nigeria encounters significant challenges with water pollution, but several successful projects and approaches have been aimed at solving these issues. Below are some examples of effective water pollution reduction initiatives in Nigeria.

### Ogun State Water Quality Monitoring Project

Location: Ogun State, Southwestern Nigeria

Overview: The Ogun State government, working with NGOs and local communities, has started a project to monitor water quality to tackle the increasing issue of water pollution caused by industrial spills and farm runoff.

### Key Strategies

*Community Involvement:*

Residents have been trained to check water quality indicators, which allows them to find and report sources of pollution. Data Collection and Analysis:

They collect samples from different water bodies and test the results to inform policymakers and the general public.

*Awareness:*

The program includes educational activities to raise public awareness about the causes of water pollution and ways to reduce it.

*Results:*

There have been notable reductions in pollution levels in the major waterways monitored by community members.

Greater awareness led to fewer harmful farming practices and better waste disposal methods among residents.

### Rivers state water pollution prevention and control

Location: Rivers State, South-South Region, Nigeria

Overview: This initiative aims to reduce oil spills and industrial waste pollution in nearby rivers, especially in areas significantly affected by oil exploration and production.

### Key Strategies

*Collaboration with Oil Companies:*

Form partnerships with oil companies to ensure stronger environmental control practices and monitoring systems are implemented.

*Restoration Efforts:*

The project includes restoring mangroves and wetlands, which naturally filter out pollution and provide barriers against oil spills.

*Local Education:*

A training program has been started to teach local fishermen and farmers sustainable methods to protect water bodies.

*Result:*

The water quality in the affected areas has improved, leading to a recovery of fish populations and better livelihoods for the local people.

Cooperation among local communities, environmental groups, and business stakeholders has been strengthened to promote a culture of corporate social responsibility.

**The Lagos State wastewater management project**

Location: Lagos State, Nigeria

Overview: Lagos State launched a comprehensive wastewater management project to address the poor state of water quality caused by inadequate sewage and wastewater treatment systems.

**Key Strategies**

*Infrastructure Improvement:*

New wastewater treatment facilities are being built, and existing ones are being upgraded to enhance capacity and efficiency.

*Community Involvement:*

Steps have been taken to encourage good hygiene habits among the population to reduce pollution from household waste.

**Conclusion**

Water pollution in Nigeria is a serious and complex problem that threatens public health, the environment, and economic growth. A combination of factors, including industrial waste,

agricultural runoff, poor sanitation, and contamination of freshwater sources, has led to severe contamination of many water bodies. These problems have serious implications for health and food supply, employment, and the overall well-being of society.

Furthermore, harmful chemicals such as heavy metals from factories and chemicals from farms can cause serious health problems such as organ damage, developmental disorders, and increased risk of disease, including cancer, if exposed to these hazardous substances over a long period of time. Thus, the impacts of water pollution are not only emergencies but also cause ongoing health problems, strain health care, and increase inequalities.

*Social and economic impacts*

In addition to its direct health impacts, water pollution has far-reaching economic consequences. Polluted water can reduce agricultural production by reducing crop yields and harming livestock, further threatening food security in a country where agriculture plays a key role. Deterioration of water sources also negatively impacts fisheries, reducing access to important sources of food and income for many communities in Nigeria. Moreover, low-income households are often disproportionately affected by the costs of treating waterborne diseases and remediating environmental damage, further straining already limited household resources. This has led to higher health costs and reduced funding for other essential services such as education and infrastructure development.

A comprehensive and coordinated strategy is needed to tackle Nigeria's water pollution and health impacts. This means improving regulations, strengthening pollution monitoring and policing, and investing in modernizing water systems.

Public-private partnerships can help gather resources and knowledge to implement effective water management projects. Additionally, using technology to monitor pollution levels and engage local communities can increase accountability and protect water resources.

In conclusion, Nigeria's water pollution problem requires immediate response, smart policy measures, and concerted efforts from all sectors of society. By focusing on access to clean water and pollution reduction strategies, Nigeria can safeguard the health of its people, conserve its natural resources, and chart a path towards sustainable development. Timely and sustained action is essential to break the cycle of pollution-related health problems and ensure a healthier future for all Nigerians.

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