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# Exploring the Primary Causes of Water Pollution in Sabon Birni Local Government Area, Sokoto State

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## ABSTRACT

Water is essential for survival, but unfortunately, it is becoming increasingly polluted. Therefore, our life (water) is currently at risk. We are in a crisis period. Water pollution is a critical environmental issue in rural areas like Sabon Birni Local Government Area (LGA), Sokoto State, Nigeria. This research investigates the primary causes of water pollution in the region, focusing on waste disposal practices, agricultural activities, and sanitation systems. The study employs surveys and field observations to gather data from residents and local officials. The findings revealed that improper waste disposal, agricultural runoff, and inadequate sanitation infrastructure are the leading contributors to water contamination. The study emphasizes the need for policy interventions and public awareness campaigns to address these causes and safeguard water quality.

**Keywords:** Water, Pollution, Agriculture, Causes, and Sabon Birni Local Government

## INTRODUCTION

The importance of water for sustenance of life cannot be overemphasized. Whether it is in use of running water in our homes, rearing cattle and growing crops in our farms, or the increased uses in industry, remain immeasurable. Water (H<sub>2</sub>O) is an inorganic compound that is at room temperature a tasteless and odorless liquid, which is nearly colorless apart from an inherent hint of blue. It is by far the most studied chemical compound and is described as the "universal solvent" and the "solvent of life". It is the most abundant substance on Earth and the only common substance to exist as a solid, liquid, and gas on Earth's surface. It is also the third most abundant molecule in the universe (United State Geological Survey, 2013).

The world's water resources are being managed and the various water problems which different regions of the world are experiencing (UNEP 2016). It takes a close look at growing water problems worldwide, such as access to clean water and sanitation, and the cross-cutting issues which affect them, such as energy, climate change, agriculture, and urban growth. The Report also offers recommendations on how freshwater resources could be managed more sustainably, (United Nations World Water Assessment Programme, 2017).

Pollution is the introduction of contaminants into the environment (Webster.com, 2010). Pollution is the addition of any substance (solid, liquid, or gas) or any form of energy (such as heat, sound, or radioactivity) to the environment at a rate faster than it can be dispersed, diluted, decomposed, recycled,

or stored in some harmless form. The major kinds of pollution, usually classified by environment, are air pollution, water pollution, and land pollution. Modern society is also concerned about specific types of pollutants, such as noise pollution, light pollution, and plastic pollution. Pollution of all kinds can have negative effects on the environment and wildlife and often impacts human health and well-being (Jerry A. Nathanson , 2024).

Water is considered polluted if some substances or condition is present to such a degree that the water cannot be used for a specific purpose. Water pollution to be the presence of excessive amounts of a hazard (pollutants) in water in such a way that it is no long suitable for drinking, bathing, cooking or other uses (Bulama 1995). Water pollution in rural communities is a growing concern, especially in areas like Sabon Birni LGA, where water sources are vulnerable to contamination from various human activities. Groundwater, the predominant water source in Sabon Birni, is particularly at risk due to poor waste management practices, agricultural runoff, and insufficient sanitation systems (Bello et al., 2021). Understanding the causes of water pollution is crucial for developing effective solutions to protect public health and the environment.

This study aims to identify and analyze the primary causes of water pollution in Sabon Birni LGA. By exploring the contributions of different human activities to water contamination, the research seeks to inform future strategies for improving water quality in the area.

#### **Materials and Method:**

The study utilized a combination of surveys and field observations to gather data on the causes of water pollution in Sabon Birni LGA. A total of 100 residents, including farmers, local leaders, and health officials, were interviewed. The survey questions focused on identifying the sources of water contamination, including waste disposal practices, agricultural activities, and sanitation facilities. Field observations were also conducted to assess the proximity of potential pollution sources to water bodies. The data were analyzed using descriptive statistics.

#### **Study Area**

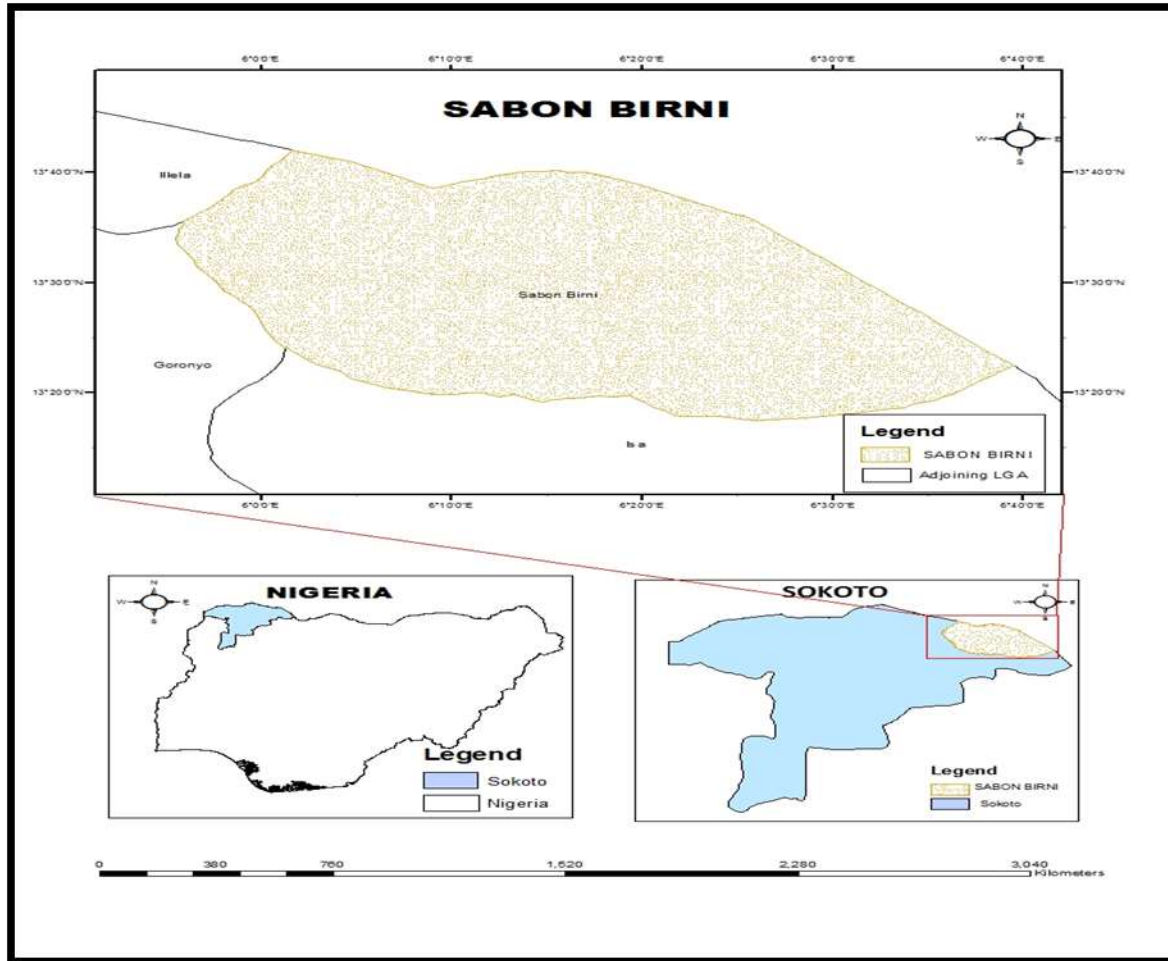
##### **Location and extent**

Sabon Birni Local Government stands out geographically located at Latitude: 13.248°, 5.8694°N and longitude 13.7561°, 6.6722°E with altitude 310 m (1,017 ft). Sabon birni Local Government area of Sokoto state, North-west Geographical zone of Nigeria and has headquarters in the town of Sabon Birni and is bordered by parts of Niger republic, Isa and Goronyo respectively. LGA made of several town and villages such as Makuwana, Lajinge, Unguwar lalle, Tsamaye, Kurawa, Tara, Gatawa, Kalgo , Gangara Ward, Sabon Birni West, and Sabon Birni East. Sabon Birni LGA occupies a total area of 2354 square kilometers and has an average temperature of 34 degrees centigrade. The LGA has average wind speed of 10 km/h while the total precipitation in the area is put at an estimated 1150mm of rainfall per annum.

The soils in Sabon Birni LGA are typically sandy loam and loamy, which are characteristic of the Sudan Savannah ecological zone. These soils are well-drained and generally support the cultivation of crops like millet, sorghum, and groundnuts (Sokoto State Ministry of Agriculture. 2018). Sabon Birni Local Government Area (LGA) in Sokoto State, the soil characteristics are shaped by the semi-arid climate, the underlying geology, and human activities.

Water Percolation is the movement of water through the soil. In arid and semi-arid regions like Sokoto, where Sabon Birni is located, percolation rates can be low due to factors such as high evaporation rates, low precipitation, and compact soil structures. The region's soil types tend to be sandy loam or sandy clay loam, which may allow moderate percolation but also experience compaction over time due to farming and grazing (Ado, & Abdullahi 2018).

Sabon Birni LGA is a hub for trade with the area hosting several markets such as popular Sabon Birni market where a variety of commodities are bought and sold.



**Figure 1.** Map of Sabon Birni Local Government Showing Study Area  
**Source:** GIS LAB Department of Geography SSCO, Sokoto (2024)

## RESULTS AND DISCUSSION

### Improper Waste Disposal:

The survey results indicate that improper waste disposal is a major cause of water pollution in Sabon Birni LGA. Over 70% of respondents acknowledged that the indiscriminate dumping of refuse, especially near water sources, is a common practice. Open defecation and the disposal of household waste into rivers and streams further exacerbate the problem. The lack of adequate waste management infrastructure contributes significantly to the contamination of both surface and groundwater (Adebayo et al., 2021).

Table 1: Sources of Improper Waste Disposal

<b>Waste Disposal Method</b>	<b>Percentage of Respondents (%)</b>
Dumping Refuse in Waterways	40
Open Defecation	30
Household Waste near Water	30
<b>TOTAL</b>	<b>100%</b>

Source field Survey2024

**Agricultural Runoff:**

Agricultural activities, particularly the use of chemical fertilizers and pesticides, are another significant contributor to water pollution in Sabon Birni. Nearly 55% of respondents recognized that agricultural runoff from farmlands, especially during the rainy season, washes harmful chemicals into nearby water bodies. This leads to the contamination of both surface water and shallow aquifers, affecting water quality for drinking and irrigation (Yusuf & Ibrahim, 2022).

**Table 2: Awareness of Agricultural Runoff Impact**

Source of Agricultural Pollution	Response (%)
Fertilizers and Pesticides	55
Animal Waste Runoff	45
<b>TOTAL</b>	<b>100%</b>

Source field Survey 2024

**Inadequate Sanitation:**

Inadequate sanitation systems, including pit latrines and open defecation, were identified as significant sources of groundwater contamination. About 65% of respondents were aware that poorly managed pit latrines could seep into nearby wells, leading to water contamination. The proximity of latrines to water sources poses a direct risk to groundwater quality, especially during the rainy season (Ogunyemi et al., 2023).

**Table 3: Awareness of Sanitation Impact on Water Quality**

Sanitation Issue	Percentage of Respondents (%)
Pit Latrines Near Wells	65
Open Defecation Near Rivers	35
<b>TOTAL</b>	<b>100%</b>

Source field Survey 2024

**DISCUSSION**

The findings highlighted that improper waste disposal, agricultural runoff, and inadequate sanitation are the primary causes of water pollution in Sabon Birni LGA. The community's reliance on groundwater makes the region particularly vulnerable to contamination from these activities. The lack of public awareness and insufficient infrastructure to manage waste and agricultural chemicals exacerbates the problem. Effective interventions, such as educational campaigns and improved waste management systems, are needed to mitigate these causes and protect water resources.

**CONCLUSION**

This research identifies the key causes of water pollution in Sabon Birni LGA, including improper waste disposal, agricultural runoff, and inadequate sanitation. Addressing these issues requires a multi-faceted approach involving public education, better waste management practices, and policy interventions to protect water sources. By understanding the root causes of water pollution, local authorities and communities can work together to safeguard water quality and promote public health.

**RECOMMENDATIONS**

**Public Education Programs:** Local government should organize public awareness campaigns to educate residents on the importance of proper waste disposal and the impacts of agricultural runoff on water quality.

**Improved Waste Management:** Investment in waste collection and management infrastructure is essential to reduce the indiscriminate dumping of waste near water sources.

**Sustainable Agricultural Practices:** Farmers should be encouraged to adopt environmentally friendly farming practices, including the use of organic fertilizers and better irrigation techniques to minimize runoff.

**Sanitation Infrastructure:** Local authorities should implement policies that require the construction of sanitation facilities at safe distances from water sources to prevent contamination.

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