



The Nigeria's drainage challenges: An opinion paper on the in-street waste water and its environmental consequences

 **Joshua Ayodeji
Gidigbi**

Chemistry Department, Modibbo Adama University, Yola, Adamawa State,
Nigeria.
Email: gidigbijoshua@gmail.com



ABSTRACT

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The drainage system is more than a building saving venture, but of life and environment. Inadequacy of drainage system characterised every nook and cranny of major parts in Nigeria, including the Federal Capital Territory, though, it is more pronounced in slums, rural and suburban areas, which accommodate the larger populace. Lack/Inadequacy of drainage system has resulted into improper disposal of greywater, as drainage system is designed to convey waste water to safer place for proper disposal are not available. The consequence of this is seen in a stream of household greywater flow out of the house to the main street. The sight of pipe conveying greywater from bathroom and laundry is a common view in most part of Nigeria, especially in a suburban area, where there is a high dense population. Different severe environmental consequences have resulted from this act, which might be a threat to public health. Also, the practice can also act as a precursor to other ailments in the society. Therefore, there is a need to create awareness on the negative impact of indiscriminate discharge of waste water on the environment. Hence, this paper seeks to review the improper greywater discharge on the street and its possible environmental consequences.

Contribution/Originality: This paper shed light on common problem created by inadequacy of drainage system, possible causes and the severe impact on the environment.

1. INTRODUCTION

The economic and social severity of runaway water has necessitated the provision for the drainage system. The drainage system is an essential social system for sustaining development and minimising the unfortunate water-related incident that may arise from water contamination. According to Damvergis [1] drainage, which is also component of sewer system, is designed to convey wastewater to a safer place for safe disposal. Drainage is considered a vital part of societal infrastructure development.

According to Kenneth, et al. [2] and Offiong, et al. [3] Nigeria experiences a growth rate that does not correspond with essential infrastructure such as drainage system. For instance, Olasehinde [4] put Nigeria's population growth at (3%), which maybe higher in rural area, this has led to creation of many more impervious surfaces, such as houses, roads etcetera.

This situation, couple with poor waste management has led to an inadequate drainage system, and while in some places, no drainage/shallow drainage. For instance, in Lagos, Olukanni, et al. [5] reported inadequacy of drainage system which has resulted into critical environmental hazard such as flooding, while blocked drain is a

common site in Ibadan [6] Oyo State. In Calabar, the capital city of Cross-Rivers state, Centre for Neighbourhood Technology (CNT) [7] reported unhealthful habit of disposing solid materials inside the drainage, which eventually blocked the drain. Also, Kenneth, et al. [2]; Idoko [8] revealed the presence of poor drainage system in the nation's Federal Capital Territory, Abuja. Offiong, et al. [3] summarised that Nigeria's environment is faced with numerous issues regarding poor drainage systems and water tight structures which are the major causes of flooding.

This lack of drainage has led to improper disposal of household wastewater, especially greywater. The consequence of this unhealthy habit has led to streams of greywater in the street, and along the houses. This is usually common in a high dense populated area, which is usually characterised most of sub-urban, slum and rural road. Structures in some local places where made in the sense that, is either the household wastewater(greywater) is discharged on ground, or the structure is built in way that the pipe conveying wastewater from bathroom is conditioned outside. While most research has majored on the drainage system, none has ever been carried out to investigate the environmental consequences of this seemly unimportant common stream of wastewater running freely on the street. Therefore, this paper seeks to examine the possible environmental consequences of indiscriminate discharge of household greywater on the street.

2. GREYWATER: DEFINITION OF THE TERM

The day to day activities of man is mainly water dependent and therefore generate 'waste' into water Amoatey and Bani [9]. Oyebode [10] explained that wastewater is any water that the quality has been marred as a result of human activities. According to United Nation Water (UNWater) [11], wastewater is defined as water that is of no further immediate value for the purpose for which it had been used or produced because of its quality, quantity or time of occurrence. It is usually disposed out of homes, offices and industry. It comes from toilets, sinks, showers, washing machines and industrial processes, and is known as sewage.

Previous studies [12, 13] revealed that water becomes waste when its physical, chemical or biological properties have been compromised as a result of processes such as bathing, washing, cooling and cooking etc., These processes allow the introduction of foreign substances into the water, which render it unsafe for human consumption. The in-street wastewater is a term denotes of a stream of wastewater along the street, it can either be a flow or stagnant water. The in-street wastewater is usually from household wastewater (especially from bathroom, and laundry), and the impact is irrespective of the soil type, just that, it is more pronounced in a land that the soil cannot retain much of water.

3. FACTORS RESPONSIBLE FOR IN-STREET WASTEWATER IN NIGERIA

Most houses in rural and suburban areas are built without given adequate consideration to a drainage system, thereby leading to the improper erection of building without considering drainage channel. Previous studies [6, 14, 15] revealed that many houses in a highly dense populated area especially, Ibadan Lagos and Calabar were built on drainage channel due to no/little consideration to drainage system.

Rural- Urban migration is also another cause of in-street wastewater. WaterAid [16] reported that Nigeria usually experiences a drastic rural to urban migration, which placed stress on the available infrastructure, most of it all is drainage system. As a result of the migration, Olukanni, et al. [5] further revealed that the urban drainage system in Nigeria has overstretched due to urbanisation, population growth and lack of maintenance. This has given way to indiscriminate discharging of wastewater, a major cause of in-street wastewater.

Also, Kenneth, et al. [2] reported that in such a high dense area, especially, suburban areas, houses are built with no/or little space in-between, which has encouraged indiscriminate disposal of wastewater. This is the major reason why in-street wastewater is a common sight in suburban area. Jimoh [17] also reported that natural causes such as topography influences soil infiltration on the in-street wastewater management. Some streets are not well

graded to obtain a flat landscape, such at the advent of intense rainfall tends to witness storm water, which later creates a path for in-street waste water. This is a major cause of in-street wastewater in villages and hamlets, couple with the fact that as the houses are well spaced enough.

Table 1 presents microbes, elements that are present in the household wastewater and the impact on the environment.

Figure 1 shows the in-street wastewater constitute to stagnant water in one of the slum area of Lagos state, Nigeria.

Figure 2 shows waste water from the household in Ilesa, Osun State Nigeria.

Figure 3 shows wastewater discharged from household into the street at Ipaja, Lagos State, Nigeria.

Figure 4 shows accumulation of waste water discharge on the street of Yola, Adamawa State, Nigeria.

Table 1. Components present in household wastewater.

Component	Of special interest	Environmental effect
Microorganisms	Pathogenic bacteria, virus and worms eggs	Risk when bathing and eating shellfish
Biodegradable organic materials	Oxygen depletion in rivers and lakes	Fish death, odours
Other organic materials	Detergents, pesticides, fat, oil and grease, colouring, solvents, phenols, cyanide	Toxic effect, aesthetic inconveniences, bioaccumulation in the food chain
Nutrients	Nitrogen, phosphorus, ammonium	Eutrophication, oxygen depletion, toxic effect
Metals	Hg, Pb, Cd, Cr, Cu, Ni	Toxic effect, bioaccumulation
Other inorganic materials	Acids, for example hydrogen sulphide, bases	Corrosion, toxic effect
Thermal effects	Hot water	Changing living conditions for flora and fauna
Odour (and taste)	Hydrogen sulphide	Aesthetic inconveniences, toxic effect

Note: CGI [12]; Henze and Ledim [13].



Figure 1. In-street wastewater (stagnant water) in one of the slums area in Lagos.

Note: WaterAid [16].



Figure 2. Waste water from bathroom contributing to in-street wastewater in Ilesa, Osun State.



Figure 3. Waste water discharge flowing within the street in Ipaja, Lagos state.



Figure 4. In-street waste water in Yola, Adamawa State.

4. ENVIRONMENTAL CONSEQUENCES OF IN-STREET WASTEWATER

According to Odigie [18] one of the major critical challenges of developing nations is improper management of the immense quantity of wastewater produced by several anthropogenic activities. This is more detrimental when it comes to unsafe discharge of these wastes into the immediate environment [19]. In-street wastewater looks insignificant, because is a common sight in most rural and suburban areas yet, the environmental impact, especially on a long term is detrimental to healthy living. Due to microbial activities in wastewater [9] the in-street wastewater, when in contact with the source of drinking water is harmful to the health of the community, as Gaffield, et al. [20]; Centers for Disease Control and Prevention [21] revealed that, it may serve as a deleterious source of pollution to surface water supplies, especially after rainfall when stormwater run-off washes faecal substances into water receiving body such as stream or rivers. Unfortunately, children are often at the receiving ends of this contamination, as World Health Organisation (WHO) [22] revealed that, water contamination is a major cause of diarrhoea, and diarrhoea is reportedly responsible for high mortality and morbidity rates among under 5 children. WaterAid [16] in 2016 estimated that close to 45,000 children under the age of five in Nigeria die every year from waterborne -related diseases, while around 122,000 Nigerians including 87,000 children under 5 die every year from diarrhoea. Federal Ministry of Water Resources [15] reported that 90% of this death is directly attributed to water, sanitation and hygiene.

The in-street wastewater also indirectly contributes to mosquitoes' breeding by creating a shallow water for mosquitoes' breeding. According to Gidigbi, et al. [23] and Nigeria Demography and Health Survey [24], malaria remains the foremost public health problem among pregnant women and infants under five (5) years in Nigeria. WHO [25] further approximately estimated that 57 million cases of malaria are reported every year, and nearly 100,000 malaria-related deaths occur every year. Dealing with this malaria menace was reportedly causing the Federal Government of Nigeria 40% of their annual Gross Domestic Product (GDP) in a bid to treat, prevent and payment of workers involved [24, 26].

The community suffers economical loss due to in-street waste water. Roaming household animals can suffer health hiccups, due to consumption of in-street wastewater, especially, of the origin of black wastewater as Amoatey and Bani [9]; CGI [12]; Geary [27] reported that, wastewater contains viruses, microbes, and hydrocarbon which can upset the delicate health balance of an animal when consumed, especially on a long term.

In-street wastewater can be a source of offensive odours in a particular street, or community, especially when it is coupled with poor sanitation. Most slums area around high dense urban settlement such as Port Harcourt, Lagos and Federal Capital Territory, Abuja are usually experienced this. According to WaterAid [16] the inadequacy of sanitation facilities is the major plague of slum's settlement in Nigeria. The offensive odour drives economic opportunities away, thereby limiting the inflow and outflow of goods and services.

In-street wastewater, after intense rainfall, creates a path for erosion. When water is allowed to pass a place for a long-time, it creates a path in that region with a deeper cut. This when combined with perennial rain fall, it transforms into gully erosion over the years. This will limit the proper growth of that community, as most villages suffered from this, resulting in high transport fare, and most finding difficulty to convey their goods to the city to sell.

5. CONCLUSION

It's been proved without any iota of doubt that the negative impact of in-street wastewater is detrimental to both environment and healthy living, therefore there is an urgent need to exercise adequate measure to forestall outbreak of diseases and environmental degradation.

Settlement and integration should not only be planned for urban area alone, towns and hamlets near the urban area should also be considered in their planning as well. In the same vein, adequate attention should be given to

drainage system, in terms of increasing in the number of usages, this will prevent constant breaking down of drainage system at the upsurge of users.

Like many Southern Africa countries such as Lesotho, South Africa that utilised greywater for laundry and agricultural purpose, Nigeria Government should imbibe the practice by put in place necessary mechanism and training on how to utilise greywater for agricultural purposes instead of discharging inappropriately which causes in-street wastewater. This will alleviate the problem of shortage of water, especially in Northern Nigeria, where rainfall is minimal compared to other parts of the nation. Government at each stratum should demonstrate more will power in dealing with drainage system in the country. More drainage should be constructed to cater for increase in population while maintaining those that due for that. Also, sensitization of communities on the grave consequence of in-street wastewater should be encouraged at different tiers of government.

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