

EVALUATION OF SEWAGE MANAGEMENT SCHEME IN HOUSING ESTATES IN NIGERIA

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ABSTRACT

The study investigated the assessment of sewage management scheme in housing estate in Nigeria, with a concentration on Agbara housing estate, Lagos, Nigeria. The objectives of the study were to assess the joint source of sewage in residential estates; examine the custom of populaces near sewage managements; determine the available means of disposing sewage in the residential estates, then to inspect the sewage management scheme obtainable to diminish cohort of sewage in inhabited estates. Research design implemented for the study was quantitative technique, a number of 80 questionnaires were arranged and directed, and 100 percent were returned. Founded on the significance of the results, the research stated that the most shared bases of sewage are toilet, kitchen sink and bathtub between others in the housing estate in Nigeria. Also, the research specified that the heartening conducts amid residents of housing estate towards sewage management as the study exposed reprocessing and re-claiming of sewage to avert the atmosphere from sewage contaminants, reprocessing sewage for pecuniary reimbursements and imposing optimistic selection near sewage management events. The study recommended that inhabitants of the housing estate must take attention on commercial aids of sewage management and capitalize intelligently on them. And finally, Local actors (Governors, Chairmen, Councillors, CDAs) should warned resident on the doles attached to sewage management and conceivable conducts to chance it to currency, reprocessing and re-claimed for household such as Biogas.

KEYWORDS: *Housing, Sewer, Sewage Management, Environmental Pollution*

1.0 INTRODUCTION

Sewage schemes are portion of contemporary organisation and municipal values, which likewise embrace gas, electric, and water supply (Ladan, 2014). Maximum metropolises of the advanced countries have practical sewage management schemes, attached with scientific development that has been permitting novelties for more ecologically

approachable and well answers to placing and giving sewage (Okoye et al., 2018). Sewage is a multifaceted combination encompassing nutrients, postponed solids, pathogens, oxygen's melting matters and extra pollutants and each partakes diverse environment influence and it requirements to be willing of as it is unwelcome water from services and homes (Ladan, 2014). According to American Society of Civil as cited in Adesogan (2013)

Sewage otherwise known as wastewater is distinct as the consumed or rummage-sale water of a public, household or manufacturing which comprises softened and postponed matter which is additional demarcated as the used water and added left-over of a public such as domestic excess fluid from toilets, baths, showers, kitchens, sinks, created by residential, recognised, commercial and industrial which is accepted absent by drains and sewers. Sewage management has been sheathing in giving adequate consideration which has been having its possessions on the atmosphere and excellence of lifecycle of populaces in a domain (Okoye et al., 2018). Sewage management is the procedure in which waste water that is willing from homes and shops, which is usually ecstatic in procedure of minor runny with postponement of small solid in big piping named sewers to yield ecologically harmless excess (Ask, 2014). The waste water are moreover absorbed to a chosen residence where it could be second-hand or likely of distant gone from the metropolitan as it can principal to feast of illnesses. Sewage management defends community well-being and averts illness, as well as water contamination from sewage pollutants. Chukwulozie et al. (2018) stated that good sewage management has been collectively putative as one of the indispensable humanoid need for a spotless and strong environment and also cited the determination of a sewage gathering which is to eliminate wastewater from ideas of source to a conduct capacity or residence of discarding.

2.0 LITERATURE REVIEW

2.1 Sewage Administration

Sewage is a water-borne left-over in explanation or in interruption that is envisioned to be uninvolved from a society's contamination consignment. It might comprise up to 99% water and branded by

capacity or degree of flow, bodily circumstances, biochemical citizens and microbiological viruses. It may be resulting from dissimilar bases such as internal, community or manufacturing fluid leftover goods willing finished pipe or sewer, and cesspools (Edo et al., 2014). Sewage is the blend of excess waters and waste matters (faeces and urine) produced from ménages, saleable locations and sweatshops that are controlled away finished superior pipes in a custom not to stance threat and well-being snags to the atmosphere and man (Tamunobereton-ari et al., 2013). Habila & Oladimeji (2020) cited of a route article on Sustainable Development Goals (SDG) marks contracted in year 2015 targets on refining passable admittance to Water, Cleanliness and Sanitation, end Open. The bodily exertion of sewage management had been mostly keen in such types of works connected to the upkeep like eliminate the hard and slush substantial from the sewer, gathering and removal of solid waste, construction of novel sewer streak and uphold the sewers (Kadam & Patil, 2016). Sewage schemes painstaking one of the major basis of left-over and impurities release to the environment. Water converts the main vehicle for the occurrence of some thoughtful illnesses to persons while the fitness disaster in some metropolises has been aggravated unpaid to high tariffs of consumption water polluted with sewage and high quantity of salt (Odigie, 2015).

2.2 Impact of Sewage Management System

Tamunobereton-ari et al., (2013) harassed that the inappropriate custom then absence of upkeep sewage schemes can consequence to the pollution of shallow water and groundwater, and the succeeding banquet of communicable illnesses related through sewage such as: cholera, typhoid fever etc. Okoye et al (2018) experiential in their study that the problematic with impolite sewage scheme remains

the adulteration of water become from pointer excavated shafts in the domains owing to its closeness to onsite hygienic amenities, obstruction of the sewerage, the sewage movements available into people's multiple and setting thereby adulterating the water basis (subversive wells, which is shared in the revision zone) and atmosphere.

Okoye et al (2018) pressure the undesirable influence of poor sewage management scheme which contains but not limited to:

- ✓ **Motionless water:** this attends as upbringing crushed for parasites and other illness trajectories. Also, pathogenic creatures that stand limited in sewage are certain to reason sicknesses and illnesses. This can likewise be answerable aimed at instigating illnesses such by way of typhoid fever, malaria, diarrhoea and dysentery.
- ✓ **Air effluence:** the rottenness of carbon-based resources that remain deserted in the pool produces vulgar smell which changes from the pond. This vulgar smell contaminates the airborne persons respire in and can generate health dangers to the inhabitants breathing everywhere the zone.
- ✓ **Water effluence:** once nearby is obstruction scheduled the sewage scheme, sewage movements on the ground superficial which contaminates underground shafts in the part. This water is occasionally composed and rummage-sale by the inhabitants for numerous national drives particularly when there is scarcity of moveable water source in the parkland. Also, anywhere water piping disruption, sewage might discovery its system into the water piping producing water effluence. Water effluence can origin Diarrhoea and Dysentery toward the inhabitants.
- ✓ **Restricted programme:** the pools shaped unpaid to trouble of undertaking happening the

ground superficial by way of an outcome of wrecked or gridlocked sewage piping. Drive of persons on base wanted develop firm as a consequence of the pools that irritated the roads and paths. There is also the danger of dwindling into the pools which can get a being in straight interaction through the pathogens limited in the sewage.

2.3 Classification of Sewage

As labelled by Apu (2018), Sewage may be secret mostly into three kinds, specifically, domestic sewage, industrial sewage, and rainstorm sewage.

I. Local Sewage

Local sewage contains of runny wastes creating from urinals, latrines, bathrooms, kitchen sinks, wash basins, etc. of the inhabited, profitable or official constructions. This sewage is normally tremendously foul, since of the attendance of humanoid excreta in it. National human leftover includes human excreta, urine and the related slush (together recognised as dark water), and wastewater made through bathing and kitchen (together recognised as older water).

II. Manufacturing Sewage

Manufacturing sewage contains of liquid wastes creating from the manufacturing procedures of numerous businesses, such as Colouring, Paper making, brewing, etc. The excellence of the manufacturing sewage be contingent mainly upon the type of manufacturing and the chemicals used in their procedure waters. Sometimes, they may be very vulgar and may necessitate wide conduct before being willing of in community sewers.

III. Storm Sewage

Storm sewage means water that is settled from a surface as a consequence of rainfall, snow melt or snowfall.

2.4 Sources of Sewage

Sewage is produced through houses, organisations, hospitals, marketable and built-up launches, which embraces domestic left-over liquid from toilets, baths, showers, kitchens, sinks etc. is willing of finished sewers. In many areas such as housing estate, sewage also comprises liquid waste from manufacturing and commerce. The parting and demanding of household waste hooked on older water and dark water is attractive additional collective in the industrialised world, with hoary water existence allowable toward remain rummage-sale for soaking florae or castoff for reddening toilets.

2.5 Sewage Disposal

Odigie (2015) renowned that good waste removal has become a thoughtful unruly in most cities of Nigeria while indecorous sewage management approaches could principal to pollution of groundwater. Though greatest of the pollutants limited in the sewage are being eroded absent by excess into watercourses and streams, some that penetrate the soil pollute the groundwater aquifers. Ladan (2014) in his investigation piercing out that one of such needs for good sewage is for a well environment in the housing estate. In the same mood, he harassed that Sewage removal in the covering estate is an average tricky as the exposed sanitations necessity toward stand empty on everyday root to safeguard allowed movement of sewage.

2.6 Technique of Sewage Disposal

According to Tamunobereton-ari et al. (2013), the shared sewage disposal schemes include:

- I. The Shortest Disposal Technique (Pit and dock latrines):** Pit latrine is a shortest sewage removal technique just to location of anthropological faeces and urine into an excavated mine. It is merely erected with a fleabag in the ground of around 3m to 6m bottomless and 1m wide with a minor inaugural shaped at the surface. The inaugural is rarely reserved enclosed when not in use. The solid matter in the faeces is acted upon by microorganisms and twisted hooked on a fluid, which dribbles into the nearby earth.
- II. The Conservancy Method (pail and biological latrines):** Pail latrine is a shared technique of sewage removal in the town and residential areas of emerging republics. Currently, this scheme is no lengthier used owing to the consciousness formed by administration and sanitarians on the fitness and lawful insinuations of the usage of such capacity. Faeces and urine are distributed into a pail finished of spurred tough or malleable.
- III. Water Posture/Closet System:** Water carriage/closet scheme is the maximum well-organized and disinfected technique of sewage removal. In this scheme, faeces, urine and additional left-over waters are dropped in a water closet and are flushed with clean water from the reservoir. The sewage is removed by drains to a septic tank for repression (temporary storage) or to sewers for conveyance to deed ability or last elimination home. Okoye et al (2018) pressure two approaches whereby sewage can be can be calm for real management, which includes:

IV. Central sewage system: This is the technique by which sewage is absorbed to stream hooked on the water pool originate in the parkland. Houses inside estate are just absorbed to dominant sewage pipes and discharges into the pool. The sewage occasionally flows into the open ground when there is obstruction which trimmings up founding slicks.

V. On-site/Septic Tank: A huge hole is tunnelled underground wized with sandcrete blocks with a bay pipe for .sewage and exit in this system. The tank customarily has a man hole with transferable concrete shelter with mid-air escapes for gases to leak. This system is more sanitary as the sewage does not come out to the ground exterior and do not inhabit floor area on the waysides or weaken the exquisiteness of the environments. This scheme is inexpensive to preserve and achieve meanwhile each multiple has its individual septic tank which might income up to some years toward become occupied active, earlier removal of sewage.

3.0 METHODOLOGY

The study was sustained out in Agbara, Ogun state, Nigeria. Agbara is a town in South West Nigeria. Agbara is located in the popular Ado-Odo/Ota Local Government Area of Ogun State. Agbara is very close to Lagos State but is in Ogun State. Agbara Estate has periods of involvement as a main actual estate and infrastructure developer in designing, engineering, building and effective composed. The target population of this study were 50 house owners and house users of Agbara Housing Estate, Ogun State, Nigeria. The sample size for this study were 80 respondents which were designated house landlords and house operators in Agbara House Estate, Ogun State for questionnaire. Descriptive statistics which includes occurrences, mean, standard deviation and percentages was applied to establish designs and tendencies for easy sympathetic and clarification of the results. Data composed were described using occurrence tables, pie charts and bar charts.

4.0 PRESENTATION AND DATA ANALYSIS

Table 1: Common Source of Sewage in Residential Estates

SN	Statement	N	Mean	Std. Deviation	RL
1.	Dishwasher	80	2.8875	.49041	7 th
2.	Washing/laundry machine	80	3.3500	1.65349	6 th
3.	Spa sink	80	3.6250	1.48729	5 th
4.	Shower	79	4.3544	.93422	4 th
5.	Bathtub	80	4.4250	.80779	3 rd
6.	Kitchen sink	80	4.5250	.67458	2 nd
7.	Toilet	80	4.7500	.49041	1 st
<i>Valid N (listwise)</i>		80			

Source: Field Survey, 2022.

RL= Rank Level

The table above depicts the analysis of the response of the respondents on public spring of sewage in inhabited estates in Nigeria. The analysis above showed that, The 1st rank on communal source of sewage in residential estates was Toilet, followed by kitchen sink which ranked 2nd in the analysis result, followed by bathtub which was the 3rd in the ranking level, followed by shower, which took 4th position in the ranking level, followed by spa sink, that ranked

5th in the ranking level, the 6th ranking level was Washing/laundry machine, also the result proved that the 9th level was dishwasher in the ranking level of common source of sewage in residential estates in Nigeria.

This designates that the most common sources in housing estates in Nigeria are toilet, kitchen sink and bathtub among others.

Table 2: Habit of Occupants towards Sewage Managements in Residential Estates

SN	Statement	N	Mean	Standard	RL
1.	Low appointment in sewage management	80	2.3875	1.23753	9 th
2.	Polluting Environment with sewage	80	2.4750	1.38687	8 th
3.	Causing health concerns with sewage	80	2.8000	1.14073	7 th
4.	Endangering life of aquatic animals due to improper disposal or treatment of sewage	79	3.0759	1.59946	6 th
5.	Using sewage to boost in Agriculture to boost agricultural yield	80	4.0250	1.06706	5 th
6.	Recycling to serve as a source of fertilizer	80	4.0750	.97792	4 th
7.	Positive engagement to sewage management	80	4.4000	.89443	3 rd
8.	Recycling and Reusing sewage to bring about economic benefits	80	4.4125	.89575	2 nd
9.	Recycling and reusing to prevent the environment from pollutants	80	4.6875	.73938	1 st
Valid N (listwise)		79			

Source: Field Survey, 2022.

RL= Rank Level

The table 2 above reveals the response of the respondents on custom of inhabitants to sewage managements in housing estates in ranking order. The analysis above showed that, The 1st rank on habit of inhabitants towards sewage managements in residential estates was Low engagement in sewage management, followed by Recycling and Reusing sewage to bring about economic benefits which ranked 2nd in the analysis result, followed by Positive engagement to sewage management which was the 3rd in ranking level, followed by Recycling to serve as a source of fertilizer that took 4th position in the ranking level, followed by Using sewage to boost in agriculture to boost agricultural yield, followed by Endangering life of aquatic animals due

to improper disposal or treatment of sewage that ranked 5th and 6th respectively in the ranking level, the 7th ranking level was Causing health concerns with sewage, then, Polluting Environment with sewage was ranked 8th position while the last on habit of occupants towards sewage managements in residential estates in Nigeria was Low engagement in sewage management.

This depicts that the most common habit of occupants towards sewage managements in housing estates are the recycling and reusing of sewage to prevent environment from pollutants, recycling and reusing sewage to bring about economic wealth and their positive engagement towards sewage managements.

Table 3: Means of Disposing Sewage in the Residential Estates

S/N	Statement	N	Mean	Standard	RL
1.	Pit latrine	80	1.5500	1.05423	5 th
2.	Lagoons	80	1.7625	1.11655	4 th
3.	Off Site Sewage System	80	4.2625	1.05235	3 rd
4.	Municipality System	80	4.4250	.91090	2 nd
5.	Full Sewage System	80	4.5875	.95060	1 st
Valid N (listwise)		80			

Source: Field Survey, 2022.

RL= Rank Level

The table 3 above shows the response of the respondents on available means of disposing sewage in the residential estates in Nigeria in ranking order. The analysis above showed that, the 1st rank on available means of disposing sewage in the residential estates was chemical treatment method, followed by municipality system, which ranked 2nd in the analysis result, followed by off-site sewage system, which was in 3rd position in ranking, Lagoon

system ranked 4th in the ranking level, while the last in the ranking was pit latrine system on available means of disposing sewage in the residential estates in Nigeria.

This denotes that the most common available means of disposing sewage in the residential estates in Nigeria are full sewage system, municipality system and the off-site sewage system among others.

Table 4: Sewage Managements System Available to Reduce Generation of sewage in residential estates

S/N	Statement	N	Mean	Std. Deviation	RL
1.	Physical treatment	80	4.5750	.67082	7 th
2.	Biological treatment	80	4.6500	.55347	6 th
3.	Sludge treatment method	80	4.7500	.49041	4 th
4.	Chemical treatment method	80	4.7875	.44134	4 th
Valid N (listwise)		79			

Source: Field Survey, 2022.

RL= Rank Level

The table 4 above depicts the analysis of the response of the respondents on sewage management's system methods available to reduce generation of sewage in residential estates in Nigeria. The analysis above reveals that, The 1st rank on sewage managements system available to reduce generation of sewage in residential estates was chemical treatment method, followed by sludge

system method which ranked 2nd in the analysis result, followed by biological system which was the 3rd in the ranking level, then the result proved that the last position level was physical method in the ranking level of sewage managements system available to reduce generation of sewage in residential estates in Nigeria.

This shows that the most common sewage managements system available to reduce generation of sewage in residential estates in Nigeria are chemical treatment method, sludge treatment method and biological treatment method.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Originated on the significances of the outcomes, the study concludes that the most common centres of sewage are toilet, kitchen sink and bathtub between others in the housing estate in Nigeria. Also, the study concludes that there happen a heartening conducts among inhabitants of housing estate near sewage management as the study exposed salvaging and recycling of sewage to avert the situation from sewage contaminants, reprocessing sewage for economic assistances and imposing optimistic appointment near sewage management events. In the same mood, the study also concludes that the principal obtainable means of marshalling sewage accepted in the residential estates in Nigeria are full Sewage system, metropolis scheme and off-site sewage classification. The greatest involved handling technique by the inhabitants of Nigeria housing estate sewage managements scheme to decrease sewage are chemical usage technique, sludge treatment method and biological usage technique.

5.2 Recommendations

This recommends based on the conclusion of this findings as follows:

The residents of the housing estate should take interest on economic remunerations of sewage

management and capitalise prudently on them. The residents should reassure themselves and others on appropriate method of placing sewage in such a way that it won't cause environmental health to man, animals and plants. Local actors (governor's, chairman, councilor, CDAs) should prepared resident on the reimbursements devoted to sewage management and conceivable ways to turn it to money, reprocessing and recycled for domiciliary such as Biogas.

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