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Assessing the Ecological Impact of Excreta Disposal on Lagos Lagoon, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The dumping of raw faecal waste at Iddo Jetty poses serious environmental and public health issues for the Lagos Lagoon. The effects of these behaviors on the health of communities, fish safety, and the quality of water are examined in this study. The study is to evaluate how lagoon water usage is affected by the dumping of faeces, how common waterborne illnesses are among residents and waste handlers, and to offer practical suggestions for better cleanliness.Surveys and interviews were conducted with 163 respondents and 33 garbage handlers to gather field data. Both quantitative and qualitative analyses were performed on observations about lagoon water utilization, sanitation procedures, and health outcomes. The results showed that, despite serious contamination, 74.2% of respondents depend on the lagoon for fishing, and 2.5% drink the water.

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Residents reported 13.5% typhoid, 16.6% cholera, and 23.9% dysentery. Waste handlers who came into touch with raw faecal effluent reported getting typhoid (12.1%) and diarrhea (18.1%). Furthermore, 23.3% of those surveyed said that fish from the lagoon were unfit for human eating due to faecal pollution. The investigation comes to the conclusion that Iddo Jetty's poor waste management and sanitation seriously endanger the community's health and harm the lagoon ecology. To guarantee the lagoon's sustainable use, immediate actions include installing centralized sewage systems, building adequate sanitary facilities, raising public knowledge of health hazards, and upholding environmental protection laws.

Keywords: Impact; excreta disposal; Lagos Lagoon; ecosystem.

1. INTRODUCTION

This lagoon plays a key function for human society due to the wealthy and vast Mollusca and fishing exploitation and commerce. However, the environment is also particularly vulnerable to the stress exerted by human activities that may influence and damage its ecological equilibrium. The continued usage as the ultimate sink for the discharge of untreated sewage and industrial effluents requires constant bio monitoring of the lagoon. The dumping of human excreta into aquatic habitats is a continuous environmental concern, particularly in quickly urbanizing countries where sanitary infrastructure is inadequate. Lagos Lagoon, located in the southwestern section of Nigeria, is one of the largest and most biologically significant coastal water basins in the region. This lagoon supports a variety of socio-economic activities, including artisanal fisheries, transportation, and sand mining, and also provides a habitat for diverse aquatic creatures (Awosika et al., 2021). However, its proximity to Lagos, Nigeria's most populated city, exposes it to substantial pollution pressures from home, industrial, and agricultural sources. Among these, the direct and indirect disposal of untreated human excreta into the lagoon stands out as a key contributor to water quality decline and ecosystem disruption (Adeniji et al*.,* 2020). Human excreta contain high concentrations of organic matter, nutrients such as nitrogen and phosphate, and microbial infections, which can drastically affect the lagoon's physicochemical qualities. Excessive nutrient loading leads to eutrophication, a state characterized by algal blooms, oxygen depletion, and habitat destruction, which can upset the ecological balance and destroy biodiversity (Nwankwo et al*.,* 2018). Furthermore, the entry of microbiological contaminants increases the frequency of waterborne diseases, providing health hazards to communities that rely on the lagoon for drinking water, fishing, and recreational activities (Ayeni et al*.,* 2022).

Previous studies have demonstrated that the Lagos Lagoon is already experiencing diminishing water quality due to urban runoff and garbage disposal practices. For instance, Olusola et al. (2019) discovered higher levels of biochemical oxygen demand (BOD), chemical oxygen demand (COD), and faecal coliform bacteria in numerous regions of the lagoon, correlating these indications to poor sewage disposal. Additionally, the influx of untreated human waste affects the natural biogeochemical cycles of the lagoon, contributing to sediment contamination and harmful algal blooms, which can have cascade impacts on the food web and ecosystem functioning (Akintola et al*.,* 2020). Sewage disposal in natural waters is a frequent practice among many cultures. Large inputs of organic matter and nutrients from raw sewage to a poor hydrodynamic environment pose environmental and health hazards from deterioration of water quality (Ribeiro and Araujo, 2002; Cimino et al., 2002; Rajagopalan, 2005; Al-Dahmi, 2009). Inadequate or malfunctioning sewerage and/or sewage treatment systems are primary causes of pollution in natural waters. The exponential development in urbanization through the migration of people from rural and semi-urban areas to cities in quest of livelihood has contributed to the deplorable sewage issues in most major cities of the world, notably in developing countries.

The Lagos lagoon, which is the focus of the current research, like many coastal lagoons, functions as a seaport, a center for recreational sailing, and a sink for dumping home and industrial pollutants. A scarcity of information exists on the degree of pollution of the lagoon (Iwugo et al*.,* 2003). The implications of incorrect sewage disposal in the city are numerous, which include degradation and depreciation of the

environment, high cost of curative and preventative healthcare, contamination of rivers, and destruction of aquatic life. This study intends to analyze the ecological impact of excreta disposal on Lagos Lagoon, concentrating on its effects on water quality, aquatic biodiversity, and overall ecosystem stability. By merging field-based data, laboratory analysis, and insights from existing research, this study strives to give evidence-based suggestions for addressing the environmental concerns caused by poor sanitation practices. The findings will contribute to the development of appropriate waste management techniques and guide policies to safeguard the ecological integrity of Lagos Lagoon.

2. MATERIALS AND METHODS

2.1 The Study Area

The lagoon, which is the focus of this research, is located behind the University of Lagos, Lagos, Nigeria. The lagoon system is an extensive water body in the heart of the metropolis, and cuts across the southern portion of the metropolis, linking the Atlantic Ocean (in the west and south) and Lekki lagoon (in the east). It is about 6354.788km2 in area and 285 km in perimeter (Okusipe, 2004). Along its path, the lagoon provides places of abode and recreation, means of livelihood and conveyance. Generally within the metropolis, untreated excreta, together with commercial and industrial effluents are discharged into the Lagos lagoon system daily. In addition to wastewater from industries, there are domestic sewage discharges; refuse and wood shavings from sawmill depots along the shores of the lagoon (Iwugo et al., 2003, Foe, 2006). The proliferation of urban and industrial establishments along the shores of the lagoon has resulted in severe pollution problems.

2.2 Instrumentation for Data Collection

The tools employed for data collection in this study are two the first instrument is the questionnaire; three categories of questionnaire were designed and distributed as indicated above. Sixteen sterilized eve-table water 75cl containers were used to take water samples, and simultaneously kept in cooler containing ice-cubes, together with two unidentified fish purchased from a fisherman.

2.3 Sample Frame, Sample Size and Sampling Procedure

The entire stretches of the Lagos Lagoon comprise the sample frame. Iddo and Ikeja discharge points make up the sample size, Iddo discharge point served as experimental sample, while “Odo Iya Alaro” at Ikeja was the control sample. The littoral space adjoining Iddo discharge point was subdivided into six divisions based on geographical partition Table 1.

Sixty percent of people in each cluster were randomly selected and questionnaires were subsequently distributed to them (Table 2). Each officer heading the nine units that make-up the Sewage department in the Ministry of Environment at Alausa, and 33 excreta waste handlers registered to operate at Iddo jetty was also sampled. Therefore, One thousand and sixty-five questionnaires (66% of 315) were administered. While One thousand questionnaires (97% of 1065) were retrieved (Table 2) and used for analysis.

Table 1. Sample Frame and Sample Size

Description Respondents	Samples Frame	Sample Size	%
Petty trades on the carter bridge	36	22	60
People in the first motor park	63	38	60
People in the second motor park	53	32	60
People in the third motor park	57	34	60
Plank house at Iddo Jetty	31	19	60
Officers at Sewage Department Alausa, Ikeja	9	9	60
Excreta waste handlers	33	33	100
Total	**315**	**207**	**100**

Table 2. Analysis of number of questionnaire distribution and retrieved per category of respondent

Description respondents	Number of questionnaire distributed	Number of questionnaire retrieved	Total retrieved per category of questionnaire
Petty trades on the carter bridge	110	110	
People in the first motor park	190	185	
People in the second motor park	160	160	
People in the third motor park	170	170	
Plank house at Iddo Jetty	100	100	
Petty traders under the bridge opposite Iddo Jetty	95	90	815
Officers at Sewage Department Alausa, Ikeja	45	20	20
Excreta waste handlers	165	165	165
Total	**1035**	**1000**	**1000**

2.4 Methods of Data Collection

Both primary and secondary methods of data collection were employed for this study. For secondary data, relevant published, unpublished, journals, newspapers/magazines and internet literature was consulted. In addition, records relevant to this investigation were collected from Sewage Department in The Ministry of Environment at Alausa, Ikeja.

However, direct personal observation, communication with respondents, personal interview technique, and self-questionnaire administrations were employed to elicit primary data. Water and fish samples were also taken for potential clinical analysis to establish the impacts of excreta clump into the lagoon on the lagoon ecosystem and the health of the public.

2.5 Methods of Data Analysis

The descriptive Statistical tools were employed to conduct out rational statistical analysis of garnered socio-economic data. These include tables, percentages, pie, and bar charts. The second set of data derived from laboratory test was analyzed descriptively using World Health Organization and European Commission.

2.6 Building Social Capital with Public-Private Partnerships

In the discourse of development theory/ much attention was paid to the growth of social capital within communities. Social capital development within communities entails a process in which community's increase participation in their own governance. Governance in the context of social capital can take many forms directly related to political office or indirectly related to community networks. Increased participation has the possibility to establish better governance.

The synergistic effect between community involvement and effective governance can have positive effects on other community structures.

2.7 Urban-Rural Metabolic Rift

Marx theorizes that a metabolic fissure occurs in a capitalistic society between town (urban centres) and country (rural periphery). The rift occurs as nutrients migrate out of the country and into the towns for consumption. After the nutrients are consumed by the town, wastes are disposed the nutrients the capitalist dichotomy created between town and country disrupts nutrient cycling. Integrated Urban Environment Initiative Household Survey (IUEISL) The household survey was developed to gather a greater understanding of the Lagos community. General information about the community was acquired through discussions with officials from Mainland and Island municipality but the validity of this information was suspected to be under representative of the truth about the community.

2.8 Validity of the Instrument

The designed questionnaire will be given to my colleagues in the same field of study for suggestion, and also to other tutor for eye see and move useful suggestions, and ultimately to any supervisor for advice and final approval.

2.9 Reliability of Instrument

Reliability was defined by West fall and stanch as the characteristic of research methodology, which allows it to be repeated again by the same and by different researchers but with the same result. Poor questionnaire or samples which are always representation of the population is those factors which make it unlikely that repetition of the same project yield the same result.

3. RESULTS

The aquatic environment is that part of the earth covered with water and it is called the hydrosphere, air is the atmosphere while soil is the lithosphere. Hydrosphere, atmosphere and lithosphere comprise the biosphere e.g. an environment where living things are found microbes are minute living things that occur in all environments and are therefore ubiquitous.

However, the demographic data will first be dealt with, while that of data analysis and discussion of finding on questions relevant to the research hypothesis come up later.

3.1 Socio-economic and Environmental Characteristics of IDDO (Apapa L.G) and Odo Iya Alaro (Ikeja L.G) Jetties

The outcome of the study carried out in this study is presented and discussed in this section the analysis is subdivided into seven sections based on the categories of questionnaires distributed. Iddo jetty was been monitored for a period of 31days (12th March to 11th April of the year of study) and samples of water and fishes taken from both Iddo and Odo Iya Alaro jetties; on Tuesday 8th and Friday 18th March, of the year of study.

Firstly, the socio-economic profiles of the people occupying Iddo jetty, and their view concerning condition of the lagoon water vis-à-vis the impact on the environment was discussed. Secondly, information relating to excreta waste handlers gathered during the study was analysed and discussed. Thirdly, the activities of officers in the Sewage Department, Ministry of Environment at Alausa in Ikeja was brought to the fore.

Therefore, an eventual outbreak of any infectious disease at the site of discharge meant the unfettered transmission into the nooks and crannies of the state. Only few of the people occupying the littoral space are residents living in 'overhung structures' erected on the bank of the lagoon. Majority of them commute from their various abodes located across the Lagos State on daily bases to Iddo for economic reasons, the people occupying the littoral space of Iddo jetty come mainly from the adjoining Local Government Areas.

As revealed in Table 3, 26.4% of the respondents reside in Apapa Local Government, followed by 21.5% living in Mainland, 16% in Ajeromi/Ifelodun and 13.5% commuting from Lagos Island. Respondents residing in Surulere 12.3% are also significant. Fig. 1 depicts the locations of the respondents' abodes clearly.

3.2 Sex of Respondents

About 57% of the respondents are male 8.0% of which is drivers (Table 5) who engaged in inter-state transit. They might serve as vectors for faecal-oral diseases across the country; 43% of the respondents are female out of which 9.8% are food vendors whose hygiene practices are questionable.

The preparation of food for public consumption takes place on the bank of the polluted lagoon, very close to 'overhung toilets' on every business day. These food vendors also situated their cafeterias around the discharge point, about forty meters away.

3.3 Occupation of Respondents

The major occupation going on around Iddo discharge point is trading. 69 (42.3%) of the people are traders who sell consumable goods. 22 (13.5%) involved in conveying people and goods within Lagos State and to other parts of the country. 12.3% are artisans, amongst who vulcanizes, repair vehicles, shoes, and wrist watches (Table 6) also, 12 (7.4%) engage in 1 occupation or the other, ranging from pay-phone call, vendor to touting. Only 10 (6.1%) of the respondents are fishermen. Perhaps, poor population of fish in the lagoon around Iddo is the cause of less concentration of fishermen at the jetty during one of the researcher's discussions with a fisherman, it was claimed that there has been a drastic reduction in the quantity of fishes being caught in the lagoon lately.

There are 5 (3.1%) respondents who claimed to be medical practitioners that sell medication to those who are sick; they also confirmed that

faecal related infections are the most probable complaints of the people at Iddo jetty. To further affirm that Iddo jetty is a well-established community, there was a teacher (0.6%) who tutor children and operates like a day-care center. Besides, the heterogeneous occupation of the respondents also portends another danger for the spread of faecal-oral infections in the State. Traders, from whom remote and immediate people buy goods of trade, can pass faecal associated infections to unsuspecting buyers when goods exchange hands.

Table 3. Return of Questionnaire

	Total No. of Questionnaire	Percentage
No of questionnaires administered	1065	100
No of questionnaires returned	1001	94
No of questionnaires not returned	64	6

Table 4. List of Local Government Area of Residence of People Working at Iddo Jetty

Local government	Frequency	Percentage
Surulere	20	12.3
Lagos Mainland	35	21.5
Apapa	43	26.4
Ajeromi/Ifelodun	26	16.0
Mushin	3	1.8
Eti-Osa	1	0.6
Lagos Island	22	13.5
Agege	7	4.3
Ojo	1	0.6
Kosofe	3	1.8
Ikeja	1	0.6
Ikorodu	1	0.6
Total	**163**	**100.0**

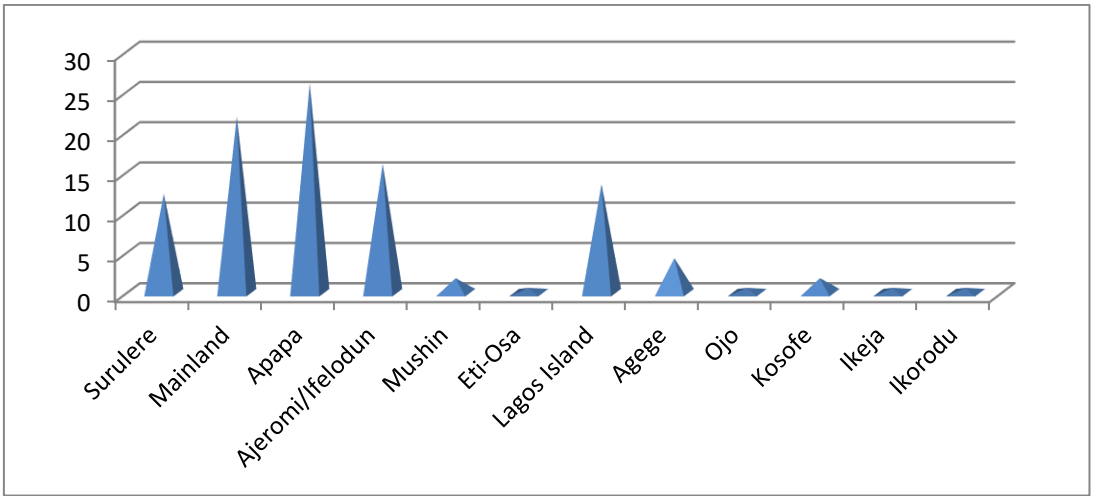

Fig. 1. Local government of residence of people working at Iddo jetty

Table 5. Sex of the respondents

Sex	Frequency	Percentage
Male	93	57.0
Female	70	43.0
Total	**163**	**100.0**

Table 6. Occupation of Respondents

Occupation	Frequency	Percentage
Trading	69	42.3
Food vending	16	9.8
Artisan	20	12.3
Commercial motorcycle rider	9	5.5
Lorry and bus drivers	13	8.0
Business	12	7.4
Medical	5	3.1
Security	4	2.5
Fishing	10	6.1
Civil servant	2	1.2
Force	1	0.6
Student	1	0.6
Teaching	1	0.6
Total	**163**	**100.0**

3.4 Location of Toilets at Iddo Jetty

In addition to the raw faecal effluent being discharged into the Lagos lagoon at Iddo on daily bases, toilets made of planks or bricks are situated at the bank of the lagoon from where undiluted faeces are discharged into the Lagoon.

Fig. 2 conspicuously illustrates that the number of respondent who confirmed that the toilets are located at the bank of the lagoon outnumbered that of those who said that the location of the toilet is far away from the lagoon.

3.5 Charges Per Use of Toilet at Iddo Jetty

Table 5 shows that the user of these insanitary toilets located at the bank of the lagoon part with 10 to 20 naira before permission is granted to use any of the toilets. During the researcher's friendly investigation, it was discovered that the construction of the toilets was not authorized by any government agent but are erected and operated by individual who laid claim to the ownership of the bank of the lagoon.

Table 7. Location of Toilets around Iddo

Location	Frequency	Percentage
On the bank of the lagoon (below 10m)	143	87.7
Far away from the lagoon (above 120m)	20	12.3
Total	**163**	**100.0**

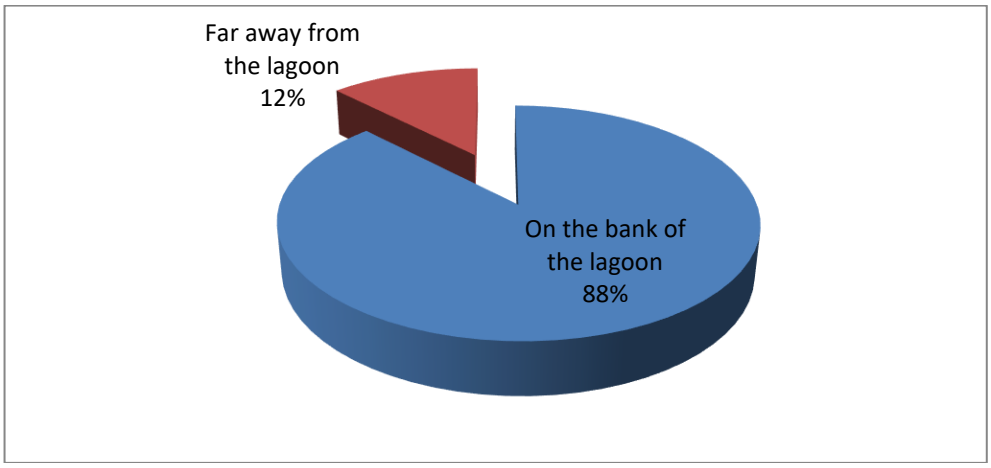

Fig. 2. Location of toilets around Iddo

Table 8. Charges per use of toilet at Iddo

Charges in naira	Frequency	Percentage
10.00	24	14.7
20.00	138	84.7
30.00	1	0.6
Total	**163**	**100.0**

Table 9. Availability of water for anal cleaning in the toilets at Iddo

Response	Frequency	Percentage
Available	140	85.9
Not available	23	14.1
Total	**163**	**100.0**

However, with over erratic supply of portable water in Lagos State, any time water is unavailable. The users of these toilets are exposed to infections of any types that are faeces related.

Table 10. Materials used for anal cleaning when there is no water in the toilets

Materials	Frequency	Percentage
Water sachets	83	50.9
Tissue paper	57	35.0
Indifferent	23	14.1
Total	**163**	**100.0**

It revealed that 50.9% of the respondents employ water sachets [pure water], 35.0% resorts to tissue paper for anal cleaning, while 14.1% remained indifferent to the question. Probably, their last resort is lagoon water or they do not clean at all after defecation this irrevocably placed them at high risk of contracting infections.

3.6 Nuisances Created by Discharging Raw Faecal Matter into the Lagoon

One of the nuisances endangered by indiscriminate discharge of faecal effluents into the lagoon is fly infestation according to 27.0% of the respondents (Table 11), 54.0% said that insanitary discharge of raw faecal matter make the lagoon be stinking. Although 19.0% of the respondents are indifferent to the question, it is obvious from other responses that discharging of untreated excreta into the lagoon engendered environmental unfriendly conditions.

Table 11. Nuisances perceived by respondents

Nature of nuisance	Frequency	Percentage
Fly Infestation	44	27.0
Odour	88	54.0
Indifferent	31	19.0
Total	**163**	**100.0**

Against the backdrop of insanitary practices of food vendors, operators of 'overhung toilets' and most significantly, excreta waste handlers. It is not hard for housefly to carry pathogenic organisms from infected water to the food prepared for public consumption and other consumable materials usually displayed for sale around the jetty.

3.7 Cases of ill Health amongst the Respondents

It is not surprising that an intestinal disease that is induced by injecting faecal-oral. Pathogens have been reported among the respondents, considering the preceding revelations.

Table 12. Reported Cases of Infection amongst the Respondents

Nature of disease	Frequency	Percentage
Dysentery	39	23.9
Cholera	27	16.6
Stomach-upset	33	20.2
Typhoid	22	13.5
Indifferent	42	25.8
Total	**163**	**100.0**

The study revealed that 23.9% of the respondents confirmed to have suffered from dysentery; 16.6%, from cholera; 20.2% affirmed to have suffered from stomach-upset, while 13.5% confirm to have treated the typhoid. This is a vindication that the quality of the environment around Iddo is not completely healthy for human habitation, despite the fact that 25.8% of the respondents are indifferent, to the question posed.

3.8 The Importance of Lagoon Water at Iddo Jetty

Water is paramount to man's survival as the biological systems of a human include 65 percent of water. Without water, human beings cannot survive beyond 9days.

Table 13. The uses of lagoon water at Iddo

Uses	Frequency	Percentage
Drinking	4	2.5
Swimming	30	18.4
Fishing	121	74.2
Car wash	3	1.8
Washing (domestic)	3	1.8
Transport	2	1.2
Total	**163**	**100.0**

The people occupying the littoral space of Lagos lagoon at Iddo deal directly or indirectly with the water in the lagoon, and are also aware that the water stinks because of raw faeces being discharged into it. The perceived insanitary condition of the water prompted 74.2% of the respondents to say that the water is not good for any other human activity except fishing.

In Table 13, 18.4% of the respondents are using the water for swimming, 2.5% told the researcher that they consume. The water at the middle of the lagoon and not the one close to the discharge point, 3.6% of the respondents use the water for washing, while only 1.2% use the water to convey people and goods.

3.9 Condition of Lagoon Fish at Iddo

In Table 14, 23.3% of respondents confirmed that the fish in the lagoon around Iddo is not good for eating, while 21.5% said the consumption of the fish caught from the lagoon is harmless to human systems. However, the difference is not significant because of 55.2% respondents who reacted indifferently to the question.

But it is generally known that the fishes feed on raw faeces discharged into the lagoon, and it is also known that raw faeces contain enteric organisms that are detrimental to health if injected (see Table 14). Therefore, the consumption of such fishes can cause disease in man.

3.10 Excreta Disposal Methods

It seems that the majority of the respondents are oblivious of the roles of sewage treatment plant in the management of excreta waste, or they do not know that such machine exists.

Table 14. Perceived consumptive condition of fish by respondents

Condition of the fish	Frequency	Percentage
Great for Eating	35	21.5
Not Good for Eating	38	23.3
Indifferent	90	55.2
Total	**163**	**100.0**

Table 15. Suggested Excreta Disposal Methods by Respondents

Methods	Frequency	Percentage
Septic tank with soak-away pit	46	28.2
Sewage treatment plant	28	17.2
Central sewage system	24	14.7
No response	65	39.9
Total	**163**	**100.0**

Probably because 39.9% refused to respond to the question, while only 17.2% (Table 15) of them proposed sewage treatment plant, 14.7% considered central sewage system appropriate for sanitary and proper disposal of the excrete waste. 28.2% of the respondents recommended septic tank with soak-away pit.

3.11 Profile of Excreta Waste Handlers

The offices of waste handlers are located within the 4 Local Government Areas surrounding the discharge point at Iddo.

According to Table 16, 72.7% of them have their offices located on the site in question, 12.1% in Lagos Island, while 6.1% located their offices at Ebute-Meta. Few of the waste handlers (about 3.0%) have their offices at Amukoko, Orile and Ijora respectively this shows that they are allowed to run at the designated places around the discharge point.

3.12 Excreta Waste Handlers' Areas of Operation

Table 15 depicts multiple responses of excreta waste handlers concerning their areas of operation almost all of them can run in areas listed in the table. This shows that they hardly have restriction to areas and that they can evacuate septic tank anywhere they are invited among the areas listed in the Table 16.

3.13 Legend was more than One Area Sourced

Authority in charge of excreta waste handlers in Lagos State: Sewage Department, Ministry of Environment, Alausa, Ikeja, Lagos, is the authority in charge of registering waste handlers in Lagos State. According to Table 17, 93.9% of excrete waste handlers sampled said

state government is in charge of incorporating their operations.

However, 6.1% of the respondents failed to answer the question, yet it is obvious that the authority is aware of the operations of excreta waste handlers, and the discharge of untreated excreta into the lagoon. This must have prompted 36.4% of excreta waste handlers (as shown in Table 18) to assert that the authority assent to their discharging of the excreta waste into the lagoon. 3.0% said no, and 60.6% refused to respond to the question, probably out of fear of being vindicated by the researcher.

During one of the researcher's off record sessions with the officials, a senior engineer was of the opinion that the lagoon water can dilute and disinfect the excreta waste to the level that is harmless to living organisms. Rhetorically, he asked the researcher if he had seen any dead fish afloat on the lagoon! Should there be delay until such a dangerous time before reacting?

3.14 Number of Trips Per Day

Table 18 shows the number of trips that each excreta waste handler makes in a day. 12.1% of the respondents make a trip in a day. Those who claimed to make 2trips in a day are 21.2%. 48.5% confirmed to be making 3trips in a day, while 18.2% make 4trips in a day about 70.0 per cent of the waste handlers make 2 to 3trips in a day. 33 excreta waste handlers are registered to run at Iddo and its environs.

Table 16. location of offices of waste handlers

Location	Local government area	Frequency	Percentage
Lagos Island	Lagos Island	4	12.1
Iddo	Apapa	24	72.7
Amukoko	Ajeromi/Ifelodun	1	3.0
Orile	Apapa	1	3.0
Ebute-Meta	Lagos Mainland	2	6.1
Ijora	Apapa	1	3.0
Total		**33**	**100.0**

Table 17. Designated areas of operation for excreta waste handlers

Areas of operation	Frequency (n=33)	percentage
Apapa	26	78.8
Ebute-Meta	25	75.8
Surulere	22	66.7
Ajegunle	14	42.4
Ijora	33	100.0
Amukoko	33	100.0
Badia	33	100.0
Lagos Island	25	75.8
Iddo	33	100.0
Adekunle	8	24.2

Table 18. Authority in charge of registering waste handlers in Lagos State

Authority	Frequency	Percentage
State Government	31	93.9
Indifferent	2	6.1
Total	**33**	**100.0**

Table 19. Permission to dislodge at Iddo discharge point

Response	Frequency	Percentage
Permitted	12	36.4
Not allowed	1	3.0
Indifferent	20	60.6
Total	**33**	**100.0**

Table 20. Suggested frequency of trip per day by respondents

Number of trip	Frequency	Percentage
1	4	12.1
2	7	21.2
3	16	48.5
4	6	18.2
Total	**33**	**100.0**

To forecast the number of trips that excreta waste handlers make on the premise of 3trips per day, for 33 excreta waste handlers, legally registered to run at Iddo and adjourning settlements, 99trips is probable in a day. That shows that 495,000litres of faecal effluent is discharged into the Lagos lagoon at Iddo every day in a month, it is 14, 850,000litres, while 178,200,000litres is discharged annually (the volume of the tank being used is 5000litres).

3.15 Precautions against Infections

There is no known medical precaution available for excreta waste handlers to cushion health risks associated with direct dealing with faecal matter in this study. In Table 21, 87.7% of excreta waste evacuator wears gloves, while 12.2% cover their nose against possible contact of faecal-oral infections during their operation.

3.16 Diseases among Excreta Waste Handlers

Out of the 33waste handlers sampled, 17 (51.5%) willingly divulged information about ill health they had suffered due to frequent bodily contact with raw faecal effluent, while 16 (48.5%) decline to make their health status publicly. In Table 22, 18.1% had suffered from diarrhea, 12.1% from typhoid and stomach-ache respectively; while 3.1% confirmed having experienced malaria, and 6.1% cough this record has to do with their unguarded exposure to faecal effluent during operation.

3.17 Service Charge

Charge for evacuating faecal matter monthly (with reference to march 11th to April 11th): In spite of the obvious and inevitable health risks associated with dealing in evacuation and discharge of faecal matter, it remains a lucrative venture. Charge collectible per trip is consonance to distance and ranges from four to eight thousand naira, depending on the source of evacuation.

Mondays showed the range of 275,000litres it showed that there was also much difference between the maximum (450,000 litres) and the minimum (275,000 litres) volume of excreta discharged. However, the standard deviation (103,803 litres) depicted that there was much divergence from the mean (310,000 litres) recorded for volume of excreta discharged into the lagoon at Iddo on the five consecutive Mondays during which the survey was carried out, while the variance (1.1E+10) showed that the volumes of excreta discharged on Sundays vary slightly.

Table 21. Nature of reported precautions against disease

Nature of precaution	Frequency	Percentage
Covering of nose	4	12.2
Wearing of gloves	29	87.9
Total	**33**	**100.0**

Table 22. Reported cases of diseases among Excreta waste handlers

Nature of disease	Frequency	Percentage
Typhoid	4	12.1
Diarrhoea	6	18.1
Cough	2	6.1
Stomach-ache	4	12.1
Malaria	1	3.1
No response	16	48.5
Total	**33**	**100.0**

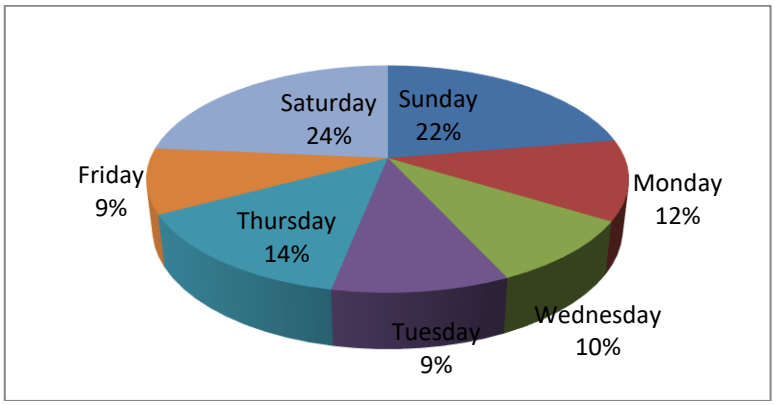

Fig. 3. Daily discharge of excreta waste (one month) (Volume in litres)

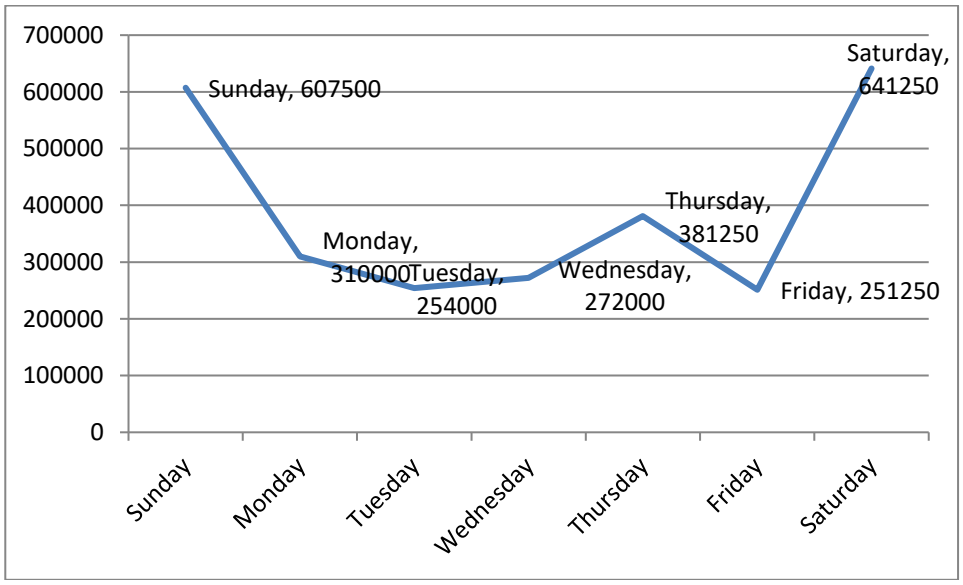

Fig. 4. Daily discharge of excreta waste (one month) (Volume in litres)

Table 23. Summaries of daily discharge of excreta at Iddo Jetty (Volume in litres) descriptive statistics

Days	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Sunday	4	50,000	590,000	640,000	607,500	22,546	5.1E+08
Monday	5	275,000	175,000	450,000	310,000	103,803	1.1E+10
Tuesday	5	195,000	180,000	375,000	25,400	73,007	5.3E+09
Wednesday	5	175,000	185,000	360,000	272,000	66,200	4.4E+09
Thursday	4	295,000	280,000	575,000	381,250	132,311	1.8E+10
Friday	4	180,000	140,000	320,000	251,250	77,500	6.0E+09
Saturday	4	275,000	530,000	805,000	641,250	131,426	1.7E+10

Legend – N- Number of days during the monitoring

On Tuesdays the range was 195,000 it showed that there was also much difference between the maximum (375,000 litres) and the minimum (180,000 litres) volume of excreta discharged. However, the standard deviation (73,007 ltres) depicted that there was much divergence from the mean (25,400 litres), that is higher volume was recorded on some Tuesdays, while the variance (5.3E+09) also showed that the volume of excreta discharged on Tuesdays exhibited much variation.

The range (175,000 litres) recorded on Wednesdays was high the standard deviation

(66,200 litres) showed that there was astounding difference from the mean (272,000 litres) recorded. The variance 4.4E+09 showed that the volume of raw excreta discharged into the lagoon at Iddo on the five Wednesdays surveyed was unequal, and that higher volume was recorded on some Wednesdays

On Thursdays the range was 29,500 litres. It showed that there was less difference between the maximum (575,000 litres) and the minimum (280,000 litres) volume of excreta discharged.

4. DISCUSSION

According to the survey, 87.7% of restrooms are located within 10 meters of the lagoon, making it easier for undiluted wastewater to be discharged directly into the body of water. Okoh et al. (2007) discovered that restrooms near to bodies of water considerably increase the risk of fecal contamination and higher coliform levels, consistent with this practice. Such close proximity exacerbates pollution, increasing nutrient loading and promoting algal bloom, according to comparable research conducted on the Lagos Lagoon system.

The critical significance that trading operations at Iddo Jetty play is emphasized by the study's finding that 42.3% of respondents are dealers who deal mostly with consumable products. According to Okoh et al. (2007), because traders' poor hygiene habits contribute to environmental pollution, trading activities near water bodies frequently elevate the peril of contamination. The restricted amount of fishermen (6.1%) indicates that Lagos Lagoon's fish population is dwindling as a result of pollution. Lagos Lagoon's aquatic biodiversity has dramatically declined as a result of organic waste from adjacent towns and heavy metal contamination, according to Akinbile and Yusoff (2011). The existence of truck and transit drivers (8.0%), artisans (12.3%), and other occupations implies occupational diversity.

However, this variance provides a concern for the transmission of faecal-oral illnesses, notably through direct and indirect contact with tainted water and products. Poor sanitation in high-density occupational areas encourages the development of fecal and aquatic maladies, according to studies by Cairncross and Feachem (1993). A possible vector for faecal-associated infections is vendors who handle consumables, particularly in light of the absence of hygienic infrastructure. According to a 2003 UN-Habitat assessment, the unclean handling of items in illegal marketplaces has a role in the spread of waterborne infections in metropolitan areas.

The lagoon's restrooms cost between 10 and 20 Naira (#) to use, which means that fundamental sanitation services are being monetized, frequently without regulatory control. In low-income communities, informal and unregulated sanitation procedures typically contribute to dangerous conditions because of a lack of government involvement and monitoring, according to UNICEF and WHO (2019). According to the survey, 85.9% of participants reported that these facilities had water for cleaning the anal region. However, Lagos State's inconsistent water supply regularly leads to times when water isn't accessible, which places consumers at risk for infections. According to Nnodim et al. (2016), Lagos' inconsistent water supply jeopardizes hygiene practices and elevates the risk of fecal-oral and waterborne illnesses.

When combined with an intermittent water supply, the utilization of filthy toilets presents significant public health hazards. In heavily crowded urban settings such as Lagos, the risk of disease transmission is very significant. Inadequate water supply and poor bathrooms in Nigerian cities were associated with an increased incidence of sanitation-related illnesses, according to research by Eja et al. (2011). The dependence on privately built bathrooms is a reflection of larger structural concerns, such as insufficient financing for water and urban infrastructure. Inadequate sanitation infrastructure was recognized by Adelakun and Ibitoye (2012) as a significant hurdle to ensuring sustainable access to water and sanitation in Lagos.

According to the table, 19.2% of respondents reported having a gastrointestinal ache, 13.5% had typhoid, 16.6% had cholera, and 23.9% had dysentery. Poor sanitation, contaminated water, and fecal-oral transmission pathways are all intimately connected with these diseases. Faecal-oral infections including cholera, dysentery, and typhoid are pervasive in locations without sufficient sanitation and safe water supplies, state Cairncross and Feachem (1993). These data corroborate the link between the high prevalence of illnesses among people and the unclean environment at Iddo. WHO (2021) emphasizes that inadequate sanitation and unsafe water are primary factors to diarrheal illnesses, which include dysentery and cholera.

The 25.8% apathy could reflect a lack of health awareness or normalization of poor health conditions in the society.

UNICEF and WHO (2019) revealed that in low-income areas, inhabitants often underreport or normalize health issues due to protracted exposure to poor environmental conditions. The data confirms the assumption that the environment around Iddo Jetty is harmful for habitation, as exemplified by the prevalence of sanitation-related disorders. Eja et al. (2011) noted those populations near polluted water sources suffer from a high prevalence of faecal-oral illnesses due to inadequate refuse management and sanitation.

According to the figures, 48.5% of waste handlers did not disclose their health status, yet 51.5% of them indicated health problems related with their exposure to raw faecal effluent. This underscores the hazards waste handlers have to their occupational health. Frequent exposure to untreated faecal matter elevates the risk of fecal-oral diseases such as intestinal parasite infections, typhoid, and diarrhea, according to Cairncross and Feachem (1993). The 48.5% non-response rate can stem from garbage handlers tolerating ill health, mistrusting health reporting institutions, or being fearful of being stigmatized. According to Nnodim et al. (2016), underreporting of occupational health concerns in Lagos is frequently caused by social stigma and a lack of health awareness. Diarrhea (18.1%) and typhoid (12.1%) were the most reported maladies, followed by stomach ache (12.1%), cough (6.1%), and malaria (3.1%). These infections can be related to unsecured exposure to pathogens during waste disposal procedures. World Health Organization (2021) emphasized that waste handlers exposed to raw sewage are at heightened risk of bacterial, viral, and parasite diseases due to inadequate occupational hygiene procedures.

According to the statistics, 39.9% of respondents chose not to answer the question on excreta disposal systems, which may signal that they were unaware of or did not appreciate sewage treatment facilities and their role in efficiently managing waste. Due to limited exposure to such systems, residents in impoverished nations usually lack information about advanced sanitation technology, such as sewage treatment facilities, as highlighted by Cairncross and Feachem (1993). The pervasive reliance on locally accessible, on-site sanitation solutions in many sections of Lagos is mirrored in the 28.2% of respondents who favored septic tanks with soak-away trenches as the best option for disposing of excreta. Septic tanks and other decentralized waste management solutions are frequently deployed in places without centralized waste management systems, yet they need regular maintenance to prevent contamination of local water supplies.

51.5% of waste handlers reported health difficulties that they attributed to direct contact with raw faecal effluent, according to the study. 48.5% of respondents, however, preferred not to disclose their health status, which could be a symptom of a normalization of health problems in this sector of employment, mistrust of healthcare systems, or embarrassment. According to Cairncross and Feachem (1993), personnel of illegal sanitation services are frequently at increased risk of contracting infections as a result of insufficient safety precautions and a lack of understanding about necessary safety practices. Of those surveyed, 18.1% reported having diarrhea, 12.1% reported having typhoid, and 12.1% reported having a stomachache. These pervasive oral and faecal infections are associated to exposure to untreated waste, underlining the filthy working environment. UNICEF and WHO (2019) affirm that laborers exposed to untreated sewage are at increased risk of developing diseases such as typhoid and diarrhea, which are both transferred through contaminated water and food.

The lagoon is a crucial resource for their livelihood, as indicated by the table indicating that 74.2% of respondents predominantly fish in the lagoon's water. A modest proportion utilizes it for imbibing (2.5%) and washing (1.8%), whereas swimming (18.4%) is another application. Despite being crucial for livelihoods (fishing and transportation), water bodies like the Lagos lagoon frequently encounter pollution, which can pose significant health dangers, as documented by Cairncross and Feachem (1993). Out of those surveyed, 74.2% believe that the water is unsuited for human use save fishing because of its reported filthy status. This raises worries about the purity of the water because the lagoon is tainted by the raw feces that are expelled. Eja et al. (2011) emphasize how contamination from untreated sewage in water bodies such lagoons contribute to the decline of water quality, rendering it unsuitable for home usage A lack of systemic management in the disposal of faecal refuse is evidenced by the considerable daily fluctuations in the volume of raw excreta released into the lagoon.

According to research like that done by Kanu and Achi (2011), untreated excreta discharged into water bodies causes environmental contamination and raises health dangers because enteric pathogens proliferate. Additionally, as proven in the Lagos Lagoon example, Ikurekong et al. (2008) emphasizes that inadequate planning and resource allocation in fecal sludge management increase these difficulties.

5. CONCLUSION

The findings from the research of Iddo Jetty reveal serious health hazards connected to the filthy conditions of the Lagos lagoon. A major percentage of the community depends on the lagoon for fishing, swimming, and other daily activities, despite the contamination caused by raw excrement dumped into the water. The majority of respondents consider the water as dangerous for most applications, and ingestion of fish from the lagoon remains controversial due to worries over contamination with harmful enteric organisms. Additionally, many waste handlers report suffering from infections, such as diarrhea, typhoid, and malaria, directly linked to their exposure to untreated trash. These findings underline the urgent need for improved waste management, better sanitation infrastructure, and public health initiatives to decrease the risks of waterborne infections and protect the well-being of the local community.

6. RECOMMENDATIONS

6.1 Centralized Sewage System Implementation

The development and implementation of centralized sewage treatment systems have to be given top attention by governments and appropriate organizations. Faecal waste would be correctly collected, processed, and disposed of as a result, lowering direct discharge into water bodies and lowering hazards to human health and the environment.

6.2 Sanitation Public Awareness Campaigns

Educating communities about the risks of incorrect excreta disposal and the advantages of using safe, sanitary practices should be the focus of extensive public health education campaigns. The health concerns of eating fish or drinking water infected by untreated feces should be addressed.

6.3 Regulatory Enforcement and Monitoring

Authorities in charge of regulatory enforcement and monitoring should implement strong rules against the unapproved discharge of feces into bodies of water. People or organizations that engage in dangerous activity may be deterred by routine monitoring and consequences for transgressions.

6.4 Funding and Assistance for Sanitation Facilities

Septic tanks and sewage treatment facilities are examples of ecologically friendly sanitation infrastructure that should be supported by subsidies during development and upkeep. Businesses and individuals may be induced to employ safer disposal practices by financial incentives.

6.5 Enhancing Research and Development Activities

To examine novel and economical faecal sludge management techniques, further research should be done. Solutions suitable to urban challenges like those encountered in Lagos can be developed through cooperative research combining academic institutions, the public and commercial sectors.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Adelekan, I. O. (2010). Vulnerability of poor urban coastal communities to flooding in Lagos, Nigeria. *Environment and Urbanization, 22*(2), 433–450. https://doi.org/10.1177/0956247810380141

Adeniji, A. O., et al. (2020). Water quality challenges in urban lagoons: A review of Lagos Lagoon. *Environmental Pollution Research.*

Akintola, S. L., et al. (2020). Eutrophication and ecosystem health in Lagos Lagoon: A multidisciplinary approach. *Journal of Marine and Coastal Studies.*

Al-Dahmi, H. (2009). Raw sewage and marine pollution information source. *National Scientific and Technical Information Center Kuwait Institute for Scientific Research.* Retrieved from http://www.docstoc.com/docs/DownloadDoc.aspx?doc_id=22862709

Awosika, L. F., et al. (2021). Anthropogenic pollution in coastal waters: Lagos Lagoon perspective. *Marine Environmental Research.*

Cairncross, S., & Feachem, R. (1993). *Environmental health engineering in the tropics: An introductory text* (2nd ed.). John Wiley & Sons. Retrieved from

Eja, M. E., Ogri, O. R., & Arikpo, G. E. (2011). Water pollution and sanitation challenges in Nigeria. *Environmental Monitoring and Assessment, 178*(1–4), 23–29. https://doi.org/10.1007/s10661-010-1675-y

http://proceedings.esri.com/library/userconf/proc04/docs/pap1579.pdf

http://www.ucd.ie/dipcon/docs/theme14/theme14_32.PDF

https://www.researchgate.net/publication/374886761_Water_Sanitation_and_Hygiene_in_Parts_of_Lagos_Metropolis

Ikurekong, E. E., Esin, J. O., & Udofia, E. P. (2008). Fecal waste disposal and environmental health status in a Nigerian coastal settlement of Oron. *TAF Preventive Medicine Bulletin, 7*, 363–366. http://bit.ly/2tAYgpo

Iwugo, K. O., D'Arcy, B., & Andoh, R. (2003). Aspects of land-based pollution of an African coastal megacity of Lagos. *Proceedings of the Diffuse Pollution Conference, Dublin,* 14–122. Retrieved from

Nnodim, J. O., Agunwamba, J. C., & Agbo, N. C. (2016). Effect of water quality on health status of the community: A case study of people living in Lagos, Nigeria. *International Journal of Water Resources and Environmental Engineering, 8*(1), 1–10. https://doi.org/10.5897/IJWREE2015.0612

Nwankwo, D. I., et al. (2018). Impacts of nutrient enrichment on the biodiversity of Lagos Lagoon. *African Journal of Aquatic Science.*

Okusipe, O. M. (2004). Lagos Lagoon coastal profile: Information database for planning theory. *Proceedings of the 24th Annual ESRI International User Conference,* August 9–13. Retrieved from

Olusola, O., et al. (2019). Human impact on aquatic ecosystems: Lagos Lagoon as a case study. *African Journal of Aquatic Science.*

Rajagopalan, V. (2005). Sewage pollution. *Central Pollution Control Board, Ministry of Environment and Forests.* Retrieved from http://cpcbenvis.nic.in/newsletter//default-newsletter.htm

Ribeiro, C. H., & Araujo, M. (2002). Mathematical modelling as a management tool for water quality control of the tropical Beberibe Estuary, NE Brazil. *Hydrobiologia, 475*(1), 229–237.

UNICEF & World Health Organization. (2019). *Progress on household drinking water, sanitation, and hygiene 2000–2017. Joint Monitoring Programme Report.* Retrieved from https://washdata.org

World Health Organization. (2021). *Sanitation.* Retrieved from https://www.who.int/news-room/fact-sheets/detail/sanitation

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