Developing Country Studies
ISSN 2224-607X (Paper) ISSN 2225-0565 (Online)
Vol.14, No.2, 2024

Optimizing Emergency Responses on Water Transport Accidents in Metropolitan Lagos

Agboga Silas Ehimen, Giwa Olayiwola Mojeed, Asenime Charle, Asaju Joel
agbogae@yahoo.com,giwaben10@gmail.com,chaeles.asenime@lasu.ed.ng,joel.asaju@lasu.edu.ng
School of Transport and Logistics
Lagos State University

Abstract
The concerns for safety have been perceived to limit the potentials of Inland Water Transportation (IWT) to serve as a complement to road transportation. This is because of the increasing rate of inland water accidents without an adequate emergency response plan in place to mitigate loss. This study evaluated the emergency responses to water transport accidents in metropolitan Lagos. Primary data which comprises of direct observation, interviews and the use of questionnaire was adopted for the research. Mixed methods were adopted for the study and the sample population comprises of inland water transport passengers, boat operators and officials of the Lagos State Waterways Authority (LASWA). Purposive sampling method alongside quota and convenient sampling methods was used to sample Three Hundred and Eighty-Four (384) respondents from Nine Thousand, Six Hundred and Seventy-Six (9,676) passengers across the selected jetties (Liverpool, Falomo, Ebute-Ikorodu and Ebute-Ojo) using Yamane's sampling technique and Three Hundred and Eleven (311) copies of questionnaire were retrieved which represents 81% of the total administered. Fifty-Two (52) LASWA officials were also surveyed at the selected jetties to collaborate with findings from the interviews of senior staff members of LASWA, boat operators and passengers. Descriptive statistical tools and one-way independent ANOVA from the Statistical Package for Social Science (SPSS) 24 was used for the analysis. Findings from the study revealed that inland waterways passengers are more interested in arriving at their destination on time and that they enjoy shorter travel distances and are willing to pay up to a 50% increase in the transport fare. The statistical comparison of the responses from passengers and the LASWA officials using the one sample t-stat test, revealed that both groups have convergent responses as their P-values <5% with t-stat values >1.960 of t-stat value in t-distribution table. The study concluded that emergency responses on the Lagos inland waterways exist in principle, but its practice is very poor due to inadequate funding, poor infrastructure, poor technical skills, low supply of emergency response officers and as such the study recommended that LASWA should carry out regular sensitization about the advantages of IWT and the safety architecture in place; LASWA should conduct boat worthiness checks every three (3) months and improve on their safety checks especially during the rainy season; establishment of a boating institute to certify.

Keywords: Accident, Water Transport, Risk, Visibility
DOI: 10.7176/DCS/9-1-08
Publication date: July 31st 2024

Introduction

Nigeria has the second longest length of waterways in Africa with a total of 8,600 kilometers. 28 of Nigeria's 36 states can be assessed through water and links to 5 countries (Benin Republic, Equatorial Guinea, Cameroon, Chad and Niger (National Inland Waterways Authority (NIWA, 2023). In Nigeria, water transportation started with the movement of people, goods and services using small dug-out canoes, later, the imperialist in their quest for more trade, introduced the steam engine and as time went on the colonial masters introduced other types of vessels for water transportation. Water transportation remains one of the major contributors to economic development of Nigeria. Nigeria's earliest importation and exportation of goods was carried out largely through water transportation due to high cost of transportation and poor level of development of other modes of transportation during this time Water transportation contributed about five billion, forty million naira to the Gross Domestic Product of the Nigeria economy in 2022 (Central Bank of Nigeria (CBN) annual report, 2022). In Lagos State, inland water transportation is a sustainable and environmentally friendly means of transportation that has helped to improve intracity transportation and reduce traffic congestion in the state. This is because most places in Lagos are assessable by water, therefore making water transportation a complement to road transportation within the state. Despite the numerous importance of water transport, concern for safety has made this mode of transportation less desirable. This is due to the continuous rise in the number of water accident occurrences without a timely and efficient emergency response plan in place to control the level of casualties. Human lives as well as valuable goods have been lost due to lack of prompt and effective emergency response thus pointing out the need for comprehensive and scientific examination of emergency responses to water transport accidents. Lagos state has suffered from acute road traffic congestion over the last four decades. It is

about the only mega city in the world with a poorly functioning integrated transport system which includes road, rail and water linkages.

These mishaps and accidents are attributed to factors which include environmental, technical, human factors or human error and organizational errors at sea, platforms and rigs leading to personal injuries, or death (Donatus, 2013; Oluseye & Ogunseye, 2016). Overloading, overcrowding, wrecks along water channels, night sailing without adequate light, absence of river marks and lack of enforcement of safety regulations by Government agencies, storms, presence of tree stumps, fire outbreaks, and alcohol intake were the main factors reported as causes of water accidents in the state (Dogarawa, 2012; Sumabe, 2013). Over speeding, the use of outdated boats with external motors and inexperienced boat operators are also causes of boat accidents. Many operators also fail to equip their boats with the most elementary safety material – life jacket which when provided, are unreliable due to poor quality (Bayode & Ipingbemi, 2016). There are also other serious risks attached to navigation on the Lagos lagoon such as collusion with other boats or floating logs and risk of fishing nets getting caught on propellers (Adeniyi, 2017). Moreso, there is the possibility of high waves sweeping off a boat causing the boat operators to mismanage the boat while in motion (Oyekola, 2023).

Many accidents occur due to the low awareness of the aspects of security and safety of the crew. Having more people on board can cause accidents and this increases the number of persons that become endangered in the event of an accident. Observations further showed that most accidents occur at the end of the day when visibility is poor. Poor lighting and alcohol intake produce bad judgment by boat operators. These hazards were particularly associated with night journeys which eventually made the State Government ban night travel on the Lagos lagoon. Most of the reported accidents occurred during the rainy season when rivers swell up and navigation becomes more difficult due to the increased volume of water. Although there are previous studies (Asenime, 2008; Ukoji & Ukoji 2016, Osoja, 2019; Aiyegbajeje & Deinne 2021; etc.) which focused on water transport as well as factors that causes water accident, but little or no efforts has been centered on the strategies for achieving timely and efficient emergency response to ensure the safety of crew and passengers at accident locations. Also, the 2022 National transport technology summit hosted by Lagos State Government highlighted the absence of research on the use of Intelligent Transport Systems (ITS) to improve emergency response time as a major contributor to the rise in the number of deaths due to water transport accidents.

As a result of the increasing number of deaths due to water accidents, the Federal and Lagos State government through its agencies - NIWA and LASWA respectively, has made frantic efforts at reducing the rate of water accident by setting up laws and safety regulators as well as enforcement of compliance. LASWA is to prosecute any boat operators in Lagos who fail to provide life jackets to their passengers (LASWA, 2015c). The Lagos state government beyond building terminals in the five divisions (Marina and Ikorodu having mega status) of the state for the seamless on boarding and alighting of passengers have also ensured the registration of boat operators, established water guards to enforce safety compliance and occasional patrol of the water ways.

Despite these efforts by the federal and state governments, the situation remains largely unchanged, possibly because the government tends to focus more on road transport than inland water transport. Consequently, the poor enforcement of safety regulations causes overloading of boats and many individuals sabotage the process of checking the integrity of boats that are majorly operated by unlicensed persons. The resultant effect shows in the rising number of water accidents with high death rates due to the delayed rescue responses from the inland water authority when the accidents occur. It is against this backdrop that this study evaluated the emergency responses to water transport accidents in metropolitan Lagos. The aim of this study is to evaluate the emergency responses to water transport accidents in Lagos Metropolis. The specific objectives are to: examine the travel behaviour of the respondents in Lagos metropolis; to establish the operational structure of water transport in metropolitan Lagos.

Significance of the Study

Every accident risk research is done with the purpose of intercepting the chain system of accident from occurring. This study provides policy makers and relevant stakeholders with an insight into the nature and causes of water transport in Lagos State. This will therefore help in the formulation and implementation of policies that seek to provide safety for people's lives and properties. This study has generated relevant information for many residents in the Lagos metropolis as well as potential investors on the importance of water transportation as an alternative means of commuting in Lagos. It exposed the challenges that both operators and passengers face and how these can be overcome. The outcome of this study also highlights the causes and preventive measures to water transport accidents. The outcome has provided information to the Lagos State government on ways to scale up its efforts on the development of water transport as a complement to the predominant road transport

through provision of infrastructural facilities and improvement in institutional capacities. This study is peremptory because it contributes to the body of knowledge around water transport in Nigeria which is presently underexploited.

Scope of the Study

This study is limited to inland water transport commuters, safety, ferry and boat operators and jetties in Lagos metropolis. It examined the travel behaviour of water transport users as well as inland water transport accident in Lagos Metropolitan area of Lagos State. The study assessed the socio-economic impacts of water transport in Lagos Metropolis as well as the factors limiting efficient use of inland waterways as an alternative means of public transport in Lagos Metropolis. The study is restricted to an inland waterway basin in Lagos Metropolis. Data was collated from both primary and secondary sources. The primary data was collected directly from the study area using both questionnaire, interview, as well as direct observations. Secondary data was collected from Lagos State Waterways Authority (LASWA) archives, and from relevant journals and publications.

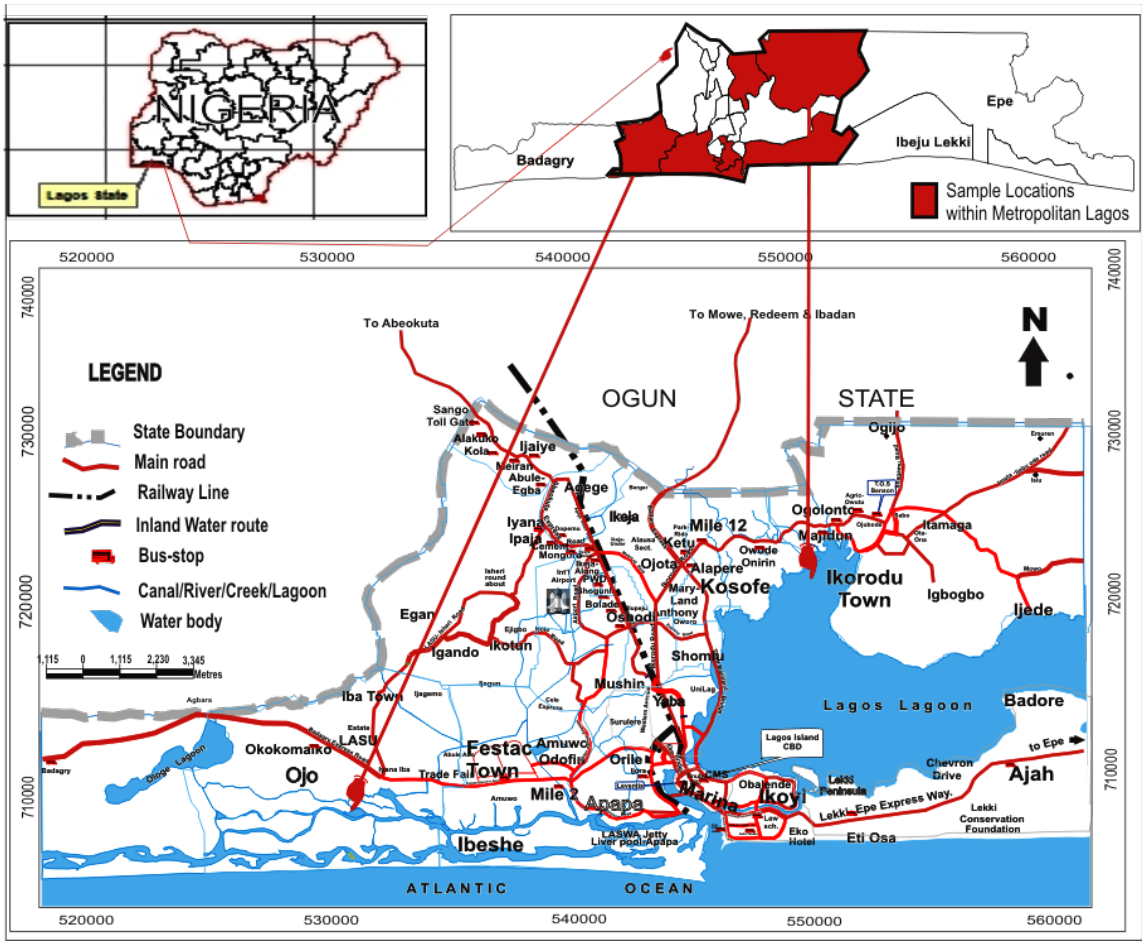

Figure 1: Lagos Metropolis in Lagos State
Source: Researcher field work (2023)

Literature Review

Islam, Rahaman, and Degiuli (2015) found that overloading and adverse weather is the primary cause of maritime accidents during 1980 to 2015. Uddin et al. (2017) analyzed the inland waterway accidents and found that the major cause of inland waterway accidents is collision for the period of 2005 to 2015. Ademiluyi, Afolabi, and Fashola (2016) in an analysis of intra-city water transportation in Lagos State found that water transportation service in the state is bad / very bad. The result also showed that several factors were identified as been responsible for low level water transport commuting in the state and they include poor water infrastructure, weak policy formulations, safety and security issues, exorbitant fares, inaccessibility and unavailability amongst others.

Similarly, Sigurd et al., (2016) opined that younger passengers and passengers on shorter trips generally have less safety knowledge than older passengers and passengers on longer trips.
Ogunbajo & Adeniyi (2017) appraised the prospects and problems of water transportation in Lagos metropolis. Appropriate review of the problems faced by both passengers and operators were analyzed using questionnaires in terms of cost of travel, travel time, problems experienced by passengers on water, purpose for traveling on water, mode of safety, issues relating to government and regulatory bodies. Issues of high cost of travel, safety concern, enforcement of regulation and provision of conducive operating environment accounts for 72%, 25%, 28% and 33% respectively by questionnaires survey tops the list of the challenges plaguing the industry.

Bassey and Ekpenyong (2018) assessed the problems and prospects of developing inland water transportation in Nigeria with Calabar River as a case study. The study revealed lack of infrastructural development, poor funding, lack of dredging and poor maintenance as the major challenges faced by Calabar inland water transportation. The study found no significant relationship between the provisions of inland transportation facilities/services and level of socio-economic development and in the study area. Owoputi, Ifabiyi and Akpudo (2018) investigated the opportunities and challenges of inland waterways transport in the southwest coastal belt of Nigeria. The study revealed that the travelled time range from 10 to 70 minutes. Also, the duration of boats rentage is one week to five weeks.

Usman and Animashaun (2020) investigated inland water transport services on Lagos Lagoon with focus on Ikorodu-Ebute-Ero route. Primary data were collected using a structured questionnaire and were analyzed using descriptive techniques. The study revealed an inadequate provision of terminal facilities and vessels in the area. It was also found that most (67.3%) of the trips via water transport in the study area were mainly for work purposes. In addition, low patronage was observed, and it was found to be mostly due to comparatively high cost of fares and passenger safety concerns, as indicated by 67.4% and 58.7% of the respondents respectively.

Aiyegbajeje and Deinne (2021) examined the perception of safety and the use of water transportation among passengers within Lagos metropolis. Using a random sampling technique, 1,050 passengers were selected across four jetties within the metropolis with a response rate of 86.3%. The step-wise multiple regression results show that passengers' perception of poor safety of water transportation predicted a significant 78.1% of reluctance to travel by water within Lagos metropolis ($F = 27990.685$, $p<0.05$).

Jobayer, Imran, Zobair, and Ahammad (2021) analyzed the accident data between 2008 and 2019 collected from the Department of Shipping of Bangladesh. They found that there is a lack of a proper accident database, many accident parameters and detailed information are not available.

Oyekola (2023) reported that high waves could sweep a boat out of control by the operators. He further highlighted that swimming ability could enhance survival rate. While there have been many studies conducted on water transportation in Nigeria and Lagos State specifically, most of the studies focused on the incidences of water transport accidents – the causation factors, effects of accidents and the safety measures put in place to prevent accidents, this study will examine emergency responses to inland waterways transport accident in Lagos metropolitan area.

Research Methods

This study adopted a mixed method of survey research design, questionnaire administration and interview. A hybrid of explanatory descriptive cross-sectional survey research design was adopted in this study. The target population is ''specific, conceptually bounded group of potential participants to whom the researcher may have access that represent the nature of the population of interest'' (Casteel and Bridier, 2021).The target population for this study include LASWA officials, boat operators and their passengers. These were selected because they are the stake holders for operations across the inland waterways in the Lagos Metropolitan Area. Daily observation was conducted for one week at each of the four jetties selected for the study i.e. Liverpool, Falomo, Ebute-Ikorodu and Ebute-Ojo to establish the direction of traffic for ferries/boat and to determine the categories of commuters along these waterways at different times of the day. Purposive sampling technique was adopted for this study.

Taro Yamane sample size calculation formula was used to determine the number of copies of questionnaire that was administered.
The formula is given as:

$$n= N/(1+N(e)^2)$$

Where: n = the sample size
N = population size
e = allowable error (0.05)
1 = constant

$n= 9,676/ (1+9,676 (0.05)^2$
n= 9,676/1+9,676 (0.0025)
n= 9,676/1+24.19
n= 9,676/25.19
n=384.12
n=384 (approx.)

Quota Sampling technique was used to determine the projected number of copies of questionnaire that was distributed at the selected jetties as presented in Table 3.2. The researcher adopted a purposive sampling method to determine the population sample for the passengers/commuters and LASWA officials while convenience sampling technique was adopted in the administration of the questionnaire. The questionnaire survey was conducted with the aid of eight research assistants who were adequately trained for the survey. In addition, the researcher interviewed the management staff and the head of the emergency response unit of the Lagos State Inland Waterways Authority.

Table 1: Number of questionnaires distributed across the selected jetties in metropolitan Lagos.

S/N	Jetty	Average daily number of passengers	Workings – Based on the proportion/Quota	Number of copies of Questionnaire distributed
1	Liverpool	3,508	$\frac{3,508}{9,676} \times 384$	139
2	Falomo	861	$\frac{861}{9,676} \times 384$	34
3	Ebute-Ikorodu	3,203	$\frac{3,203}{9,676} \times 384$	127
4	Ebute-Ojo	2,104	$\frac{2,104}{9,676} \times 384$	84
	Total	**9,676**		**384**

Source: Researcher's Calculation (2024)

The socio-economic data sources of questionnaire were analysed using simple descriptive statistics (frequency tables and charts). One-way independent ANOVA T-test analysis was used to examine the relationship between socio-economic characteristics of operators and accident experiences. A summary of the proposed method of data analysis is presented in Table 1. The components factor (items) analysis is measured based on Kaiser Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity at 95% and the instrument was regarded as adequate, when the value of KMO is between 0.5 to 1.0 (Hair et al., 2010). For the Bartlett's Test of Sphericity, small values (less than 0.05) of significance level indicate that the adequate correlation exists to justify factor (items) analysis (Hair et al., 2010). Average Variance Extracted (AVE) greater than 0.5 was treated as evidence of convergent validity of items developed for each objective of the study. The factor loadings items of these items were used to establish the AVE. The results of KMO Measure of Sampling Adequacy, Bartlett's Test of Sphericity and AVE for the variables are presented in Table 4.3b which indicated that the data for the study is reliable and valid.

Finding and Results Analysis

The copies of questionnaire that were administered to water transport passengers from selected jetty in Lagos State were 384 out of which a total of 311 copies of questionnaire were properly filled and returned. The response rate percentage was 81%; as pointed out by Bryman and Bell (2011) that a response rate of ≥50% is acceptable to analyse the results of the study. For this study, a response rate of 81% was considered very good; hence the researcher proceeded for data analysis.

Table 2 : Response Rate

S/N	Jetty	No. of Questionnaire Administered	No. of Questionnaire retrieved	Percentage %
1	Liverpool	139	110	28.65
2	Falomo	34	29	7.55
3	Ebute-Ikorodu	127	96	25.0
4	Ebute-Ojo	84	76	19.79
	Total	**384**	**311**	**81%**

Source: Researcher's Field Survey, 2024

Table 2 depicts the response rate from the questionnaire administered to the target respondents for the study. The result presented in this study, therefore, was based on the responses from the questionnaire that were correctly filled in and returned.

Descriptive Analysis for Research Objective 1

Research Question One: What is the travel behaviour of respondents in Lagos metropolis?

Table 3 : swimming ability of respondents in case of boat accident

	Frequency	Percent	Mean (Standard Deviation)
YES	88	28.3	1.7096 (0.45471)
NO	223	71.7	
Total	311	100.0	

Source: Researcher's Field Survey, 2024

Table 3 depicted field response on whether the respondents can swim. 88 (28.3%) of the respondents filled "Yes" while 223 (71.7%) of the respondents filled "No". This insinuated that many of the respondents cannot swim. If the standard deviation exceeds one, it means there is divergence opinion towards the item question while if the standard deviation is less than one, it means there exist convergence opinion of the item question in the instrument. The mean value insinuates that most of the respondents know how to swim and that there was convergence opinion that majority of respondents cannot swim since the standard deviation was less than one.

Table 4: Level of respondent's swimming ability

	Frequency	Percent	Mean (Standard Deviation)
I Cannot Swim	73	23.5	2.1287 (0.90981)
Poor Swimming	161	51.8	
Average Swimmer	42	13.5	
Excellent Swimmer	35	11.3	
Total	311	100.0	

Source: Researcher's Field Survey, 2024

Table 4, focused on the item question of "how well can respondent swim". The table 4.4 depicted that 73 (23.5%) cannot swim, 161 (51.8%) of the respondents are poor swimmers, 42 (13.5%) were average swimmers, and 35 (11.3%) were excellent swimmers. This shows that most of the respondents were poor swimmers and this

is corroborated with respondents in Table 4 that few of the respondents can swim and majority cannot swim. These responses indicate a potentially high casualty rate in the event of an accident occurrence on the water ways where there is a delay in emergency responses and if passengers fail to wear life jackets. The mean value showed that majority of the respondents agreed that they are very poor swimmers, and this is supported by the standard deviation that majority of the responses converge on the question items.

Table 5: Analysis of travel by water if the fare increases by 10%

	Frequency	Percent	Mean (Standard Deviation)
YES	222	71.4	1.294 (0.4562)
NO	89	28.6	
Total	311	100.0	

Source: Researcher's Field Survey, 2024

Table 5 explained the passengers' decision to continue to travel by water transport if the fare is increased by 10%. It shows that 222 (71.4%) of the respondents agree that if there is 10% increase in the fare of water transport, they will still prefer water transport while 89 (28.6%) do not accept to the question item that if there is 10% increase in the fare of the water transport, they will not patronize water transport. This indicated that most of the respondents prefer water transport despite if there is 10% increase in the fare price because it is faster and makes respondents meet up at the appointed time of their destination. This is supported by mean and standard deviation result that majority of the respondents converge in their opinion that if there is 10% increment in the water transport fare, most respondents will still prefer water transport.

Summary of Findings:

The major findings of the research are summarized as follows:

- The study found that water transport commuters were more interested in arriving at their destination in good time and this is achievable through water transport. This is in conformity with Obamiro et al.,(2018) that inland waterways transportation system serves as alternative transportation system to ease traffic congestion in Lagos State.
- Importantly, the study discovered that there are no specialized training centers for boat operators within the state as boat operators confirmed that that their boat operating skills were passed to them from their parents, confirming the assertion of Aiyegbajeje & Deinne (2021).

- More importantly, the feedback received from LASWA officials with respect to the time of the day in which accidents occur the most revealed that most accident occurred in the night which confirmed their non-enforcement of the curfew on night travel which has been in existence since 2014. On the other hand, passengers confirmed that most accidents occur during the morning rush hours where boat operators are in a hurry to take advantage of the morning peak period. However, all respondents agreed that the rate of water transport accidents is higher during the rainy seasons. This is in line with the summation of Dogarawa (2012) that water transport accidents are higher in the rainy season when the river rises and inland water navigation becomes more hazardous.

- The study thus established that the coordinated emergency response from LASWA cycle is within a 30-minute time frame from the time of occurrence of a reported accident. However, LASWA officials and passengers affirmed that the first responders when an accident occurs are members of neighboring communities and other boat operators and this confirmed that emergency responses from LASWA are for cases of reported accidents only.

Table 6: Comparison of Water and Road Travels by Distance and Time of Travel (Comparative Advantage)

S/N	ROUTE	WATER TRAVEL		ROAD TRAVEL	
		LENGTH (KM)	TRAVEL TIME (Minutes)	LENGTH (KM)	TRAVEL TIME (Minutes)
1	Badore-Five Cowries	30	34	22	39
2	Badore-Ijede	6	6	79	124
3	Baiyeku - Ajah Oke Ira nla	7	8	40	77
4	Baiyeku-Langbasa	4	5	73	123
5	Baiyeku-Addax	17	19	54	85
6	Ebute-Ojo-Ibasa	7	8	20	153
7	Ebute-Ojo-Ijegun Egba	8	9	14	30
8	Ebute-Ojo-Ijegun-CSM	26	29	30	49
9	Ebute-Ojo-Irewe	7	8	No route by road	
10	Ijede-Marina/CMS	29	33	49	75
11	Ijegun Egba-Ibasa	0.4	1	13	138
12	Ijora-Ebute Ero	1	2	4.7	15
13	Ikorodu-Addax/Falomo	21	24	45	53
14	Liverpool-Five Cowries	6	7	12	19
15	Liverpool-Igbo Elejo	6	7	10	39
16	Liverpool-Olodi Apapa	2	3	5.4	11
17	Marina/CMS-Ikorodu	22	24	35	48
18	Ebute Ero-Ikorodu	19	22	34	41
19	Mile 2-Addax/Falomo	16	18	15	23
20	Mile 2-Marina/CMS	12	14	14	22
21	Marina- Taekwa Bay	6	9	40	168
22	Addax-IgboElejo	14	16	21	33
23	Ikorodu (Metro)-Addax	21	22	39	65
24	Ebute Ero-Ijede	27	29	47	69
25	Ibeshe-Addax	16	17	50	64
26	Ebute Ojo-Liverpool	21	23	20	33
27	Badagry - Apapa/ Liverpool	53	60	60	86
28	Badagry to Ebute Ero / CMS	62	80	63	92
29	Ilaje Bariga - Ebute Ero	11	13	17	24
30	Ilaje Bariga - Five cowries	16	18	19	26

Source: Researcher's Field Survey (2024)

Conclusion:

Lagos is arguably the most populous state in Nigeria and remains the economic and financial hub of the country. The state with an estimated population of 21 million persons (Osoja, 2019) requires a functional integrated transport system which includes road, rail and water transportation. Sadly, the progress of inland water transport within the state is very slow when compared to road transportation. The effort of the state government towards transport development is largely seen in their drive to increase road capacity through expansion of road, construction of fly overs, introduction of Bus Rapid Transit (BRT) (Asenime 2008) and recently the revamp of the rail system (blue line and red line).Water transportation has become unpopular because it is easily accessible to residents of coastal areas and there are concerns for safety. Past researches have dealt with contributions of

water transport to economic development, the growth and development of water transportation, safety concerns but the issue of travel behaviour and emergency response as it relates to water transport has been broadly covered in this research.

Recommendations:

To address the challenges identified in the summary and conclusion of this study, following recommendations are of importance:

1. LASWA should carry out regular sensitization about the advantages of inland water transportation, the safety architecture in place for inland water transportation as well as the emergency response strategy.
2. Private organization such as Banks, information technology firms and fabrication companies should partner with the government in the provision of energy efficient boats as this will reduce the cost of boating operations thus bringing down the cost of water travel. Modern energy efficient boats will come with improved safety features.
3. LASWA must carry out improved safety checks as well as safety measures during the rainy seasons along the waterways of Lagos State before the commencement of daily operations during the rainy season.
4. The management of LASWA should ensure the daily patrol of water guard on the waterways and jetties in metropolitan Lagos to enforce safety of lives.
5. The Management of LASWA must improve on their process of incident capturing and record keeping as this will help the agency with efficient data management and accurate tracking of accidents occurrence.

References

Ademiluyi, I.A, Fashola, O.K., and Afolabi, O.J. (2016) Analysis of Intra-City Water Transportation in Lagos. International Journal of Innovative Research and Advanced Studies, 3 (8): 246-254

Adeniyi, K. (2017) Lagos waterways passengers decry safety measures https://www.premiumtimesng.com/regional/ssouth-west/248679-Elagoswaterways-passengers-decry-safety-measures.html

Agency Report (2022, July 10). Lagos Boat Accident: 13 more bodies recovered as rescue operation ends. *Premium Times*. https://www.premiumtimesng.com/news/top-news/541933-lagos-boat-accident-13-more-bodies-recovered-as-rescue-operation-ends.html?tztc=1

Aiyegbajeje F. O. & Deinne C. E. (2021). Assessment of commuters' perception of water transportation safety and patronage in Lagos Metropolis, Nigeria. *Ghana journal of Geography Vol. 13 (3)*, 146-164

Ajayi I. & Osho G. (2023, October 21). Boat mishaps: 17 people die monthly in Nigeria. The International Centre for Investigative Reporting (ICIR). https://www.icirnigeria.org/nigeria-lost-1280-lives-to-boat-mishaps-in-6yrs/

Alrehaili, Naif & Almutairi, Yousef & Alghamdi, Hamdan & Almuthaybiri, Musaad. (2023). The Need for Emergency Management Models. Journal of Emergency Management and Disaster Communications. 04. 10.1142/S2689980923500021

Asenime C. O. (2008). A study of Inland Waterway Transportation in Metropolitan Lagos. Ph.D. research work submitted to Post Graduate School, University of Lagos.

Badejo B. (2010). Developing Inland Waterways Transportation in Nigeria: What role for the private sector. The Ministry of Transportation, The Secretariat, Alausa

Bako C. D. (2022, September 29). Over 90% of Global Trade Is Carried by Maritime Transportation – Expert. *Conscience Triumph.* Over 90% Global Trade is Carried by Maritime Transportation – Expert | (consciencetriumphs.org.ng)

Bassey S. I & Ekpenyong NSA, M (2018). Problems and prospect of developing inland water transportation in Nigeria: The case of Calabar River. IOSR Journal of humanities and social science 23(7) Pp 27-37

Bayode T. and Ipingbemi O., (2016) "Safety and Operational Characteristics of Water Based transportation in Lagos State", SCIREA Journal of Traffic and Transportation Engineering, Vol.1, Issue 1, pp13-31, January 2016.

Boadu S., Otoo E., Boateng A. & Koomson D. (2021). Inland Waterway Transportation (IWT) in Ghana: A Case Study of Volta Lake Transport. International Journal of Transportation Science and Technology. Vol. 10, Issue 1, pp 20-33, ISSN 2046-0430, https://doi.org/10.1016/j.ijtst.2020.05.002. (https://www.sciencedirect.com/science/article/pii/S2046043020300332)

Bryman, A., & Bell, E. (2011). *Business research methods,* 2nd edition. Oxford University Press Inc.

Casteel, A. and Bridier, N.L. (2021) Describing Populations and Samples in Doctoral Student Research. International Journal of Doctoral Studies, 16, 339-362. https://doi.org/10.28945/4766

Central Bank of Nigeria (2023) Annual Economic Report for year 2022

Chi, Chia-Fen & C.-F, & Lin, & S.-Z, & Dewi,. (2014). Graphical fault tree analysis for fatal falls in the construction industry. Accident Analysis & Prevention. 72. 359–369. 10.1016/j.aap.2014.07.019.

Creswell, J. W. (2008). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. Upper Saddle River, NJ: Pearson/Merrill Education

Cunningham, C. J. L. (2008). *Competency-based selection*. Presentation delivered at the 8th annual River Cities I-O Psychology Conference, Chattanooga, TN

Deja, A., Kopec, A., Michaloovski, P. (2018). Analysis of the status of Inland Waterway Transport in Poland. AUTOBUSY – Technika Eksploatacja, System Transport owe 19 (9), 516–521.

Dogarawa L. B (2012) Marine Accidents in Northern Nigeria: Causes, Prevention and Management, *International Journal of Academic Research in Accounting, Finance and Management Sciences*, vol 2, pp 239-243

Ibama, B., Wocha, C. & Dike, E.C. (2015). Development of waterways for effective transportation system and recreation enhancement in selected navigable creeks and waterways in Rivers State. *International Journal of Scientific and Engineering Research 6*(9); 1016-1026

Inter-Agency Standing Committee (2015). *Guideline emergency response preparedness*. Available athttps://interagencystandingcommittess.org Accessed 20 August 2022

International Atomic Energy Agency (IAEA) (2001). Severity, probability and risk of accidents during maritime transport of radioactive material. *Final report of a coordinated research project 1995-1999*. Vienna, Austria, IAEA

Islam M. R., Rahaman M. D, & Degiuli N. 2015. "Investigation of the Causes of Maritime Accidents in the Inland Waterways of Bangladesh." Brodogradnja/ Shipbuilding Journal 66 (1): 12–22

Jafar K. (2015). The impact of water transport and economic development of Uganda's landing sites; case study of Ggaba region, Makindye division of Kampala city. B.Sc. research report submitted to the college of economics and management sciences, Kampala International University.

Jobayer, M, Imran, U., Zobair I.A. & Ahammad A. (2021). An era of inland water transport accidents and casualties: the case of a low-income country. *Journal of International Maritime Safety, Environmental Affairs, and Shipping, 5*(2), 32-39, DOI:10.1080/25725084.2021.1919432

Jukpor K. (2023, November 10) NIWA Suspends Boat Operations at Ikorodu Terminal Over Water Hyacinths. The News Diet**.** https://thenewsdietng.com/niwa-suspends-boat-operations-at-ikorodu-terminal-over-water-hyacinths/

Kalyegira T. (2000, April 21). 500 people killed in Nigerian boat accident. *UPI*. 500 people killed in Nigerian boat accident - UPI Archives

Lagos Bureau of Statistics (2020) Transport Statistics 2020. Ministry of economic Planning and Budget, Lagos State, Nigeria

LASWA, (2015c, 11 August). *Will Prosecute Boat Operators Who Fail to Provide Passengers with Life Jacket – MD*. Available at http://web.laswa-ng.com/news. Retrieved 20 August 2022

LASWA, (2015d). *Projects*. Available at http://web.laswa-ng.com/projects. . Retrieved 20 August 2022

Lawrence, B.A. Miller, T.R. & USCGAUX, D. (2006). Recent research on recreational boating accidents and the contribution of boating under the influence. Available at: https://www.researchgate.net Accessed 26 August 2022

Malik, D. L. (2011). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1,* 48-76.

Nojavan, M., Salehi, E., & Omidvar, B. (2018). Conceptual change of disaster management models: A thematic analysis. *Jàmbá: Journal of Disaster Risk Studies*, *10*(1), 1-11.

Nze, I.C. (2013) Analysis of the Fatality Rates of Boat and Ferry Accident on Inland Waterways in Nigeria. IOSR Journal of Business and Management (IOSR-JBM) 2013; 112: 17-20.

Obamiro, J.K., Elegunde, A.F. & Kumolu-John B. (2018). Inland waterways transportation system and promotion of business activities in Lagos State, Nigeria. Crawford. *Journal of Management Review 1*(2); 57-65

Occupational Safety and Health Administration (OSHA) (2013). *Process safety management and prevention of major chemical accidents.* Available at https://www.osha.gov

Ogunbajo, A. & Adeniyi, A.. (2017). The Prospects and Problems of Water Transportation in Lagos Metropolis. *LASPOTECH Journal of Scientific, Engineering and Technology Research 1, (1)*, 1 - 12,

Olawepo, R. & Asaju J. A. (2020). A Study of the Factors That Influence the Rate of Pedestrian Accidents in Lagos Ikorodu Expressway, Nigeria. The International Journal of Humanities & Social Studies. 8. 527-533. 10.24940/theijhss/2020/v8/i6/HS2006-121.

Oluseye O. O. & Ogunleye O. O. (2016) Human Factors as Determinants of Marine Accidents in Maritime Companies in Nigeria *British Journal of Education, Society &Behavioural Science* 18(4): 1-11, 2016, Article no.BJESBS.29548 ISSN: 2278-0998

Osoja, A.O. (2019). An assessment of complimentary role of water transport travel along Ikorodu Lagos Island areas of Lagos Metropolis. *East African Scholars Journal of Education, Humanities and Literature, 2*(2), 105-117

Owoputi, E., Ifabiyi, P. & Akpudo, C (2018). Opportunities and Challenges of Inland Waterways Transport in the Southwest Coastal Belt of Nigeria. Bhumi, The Planning Research Journal. 6. 10. 10.4038/bhumi.v6i1.34.

Oyekola T (2023, June 14). Kwara Boat Accident: Death toll hits 106, 144 people rescued, says Police. *Punch Newspaper*. Kwara Boat Accident: Death toll hits 106, 144 people rescued, says Police (punchng.com)

Safeopedia (2018). *Emergency response*. Available at: Https: www.safeopedia.com. Accessed 26 August 2022

Ukoji V. N & Ukoji, U. V. (2016). Boat accidents in Nigeria: General trends and risk factors (June 2006-May 2015). *ADR Journal 2*(3 & 4); 1-9

University of Nevada, Reno (2022). *5 phases of emergency managemen*t. Https://www.unr.edu (National Institute of Environmental Health Science, 2022). Https: www.niehs.nih.gov

Usman, B. A. & Animashaun, K. H. (2020). Inland Water Transport and Urban Mobility in Ikorodu-Ebute Ero Route, Lagos, Nigeria. *Geosfera Indonesia, 5*(1), 127-146. doi:10.19184/geosi.v5i1.14714

Water Transport (2022) Wikipedia. Available at: https://en.wikipedia.org/wiki/water-transportion. Accessed 26 August 2022

Young, S.T., Dong-Han, H & Wan, C. Y. (2016) Application of Activity Theory to analysis of human-related accident: Method and case studies. *Reliability Engineering and system safety Journal 150 (2016) 22-34.*