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PERCEPTUAL EXPERIENCES OF SPATIAL TREND OF PASSENGER'S VESSEL ACCIDENTS ALONG COASTAL TRANSPORT ROUTES IN SOUTH-SOUTH REGION, NIGERIA

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Abstract: The aim of this study was to analyze the variation in the trend of passenger's vessel accident along waterways in the south-south region. The volume of daily passengers from10 jetties across the coastal states with high volume of inland transportation activities (Rivers, Bayelsa, Delta, Cross River and Akwa Ibom) assessed from the archive of NIWA formed the population of this study. The sample of 395 was determined by applying' the Taro Yamane formula' resulting in the designed, validation and distribution of a total of 395 copies of questionnaire to respondents to obtain relevant information for the study. The data was presented in tables and descriptive statistics used in the discussion while Kruskal Wallis test was employed to analyze the data. The result shows over-speeding (36.4%) and overloading (36.4%) as the main human factors while storm/wind (36.9%) and navigator failure (37.4%) as the leading natural and mechanical factors that causes marine accidents in the area. The calculated value of the Kruskal Wallis test (0.007) indicate that there is no significant variation in the occurrences and frequency of passengers' vessel accident across different states in the South-South region at $p < 0.05$. The study revealed that the states have recorded high occurrences of vessel accidents attributable to varied causes in recent times attesting to the fact that there is no improvement in the sector to engender efficiency. Based on the findings, the study recommended periodic conduct of integrity test on vessels, enforcement of regulatory laws, stakeholder's engagement and collaboration.

Keywords: Waterways, Enforcement, Stakeholder's, Trend, Collaboration.

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Introduction

Water transportation system is the intentional movement of people and freight by boat, ship, barge or sailboat across oceans, sea, lake, canal, or river. Water transportation can be within region or across a continent, however, transport through all navigable rivers, lakes, and man-made canals are referred to as inland water transport. Inland Waterways Transport (IWT) is the movement of people and goods along inland waterways (Fellinda, 2006). According to Akpudo, (2021) this sub-mode of transport has at one time, or the other played an important role in the opening and development of the coast and interior of most nations. The inland waterways transport system includes canoe, speed boat, barge, tugboat, and ferry. Inland water transportation provides a cost-effective, logistically efficient, and environment-friendly mode of transport whose development as a supplementary mode would enable diversion of traffic from over-congested roads and railways, contribute to economic and social development (Obeta 2014). According to Aiyegbajeje & Deinne (2018) water transport being among the oldest mode of transport is crucial to the development of any nation. It provides means of transportation for both rural and urban dwellers, particularly along the coastal areas and inland waterways. Water transportation is the cheapest and safest among the other modes and can be relied upon for pleasurable and relaxing journeys when quality services are provided. Nigeria's earliest involvement in importation and exportation of goods depended largely on maritime transport because other modes - air, rail, pipeline, and roads were either nonexistence or less developed or very expensive (Bassey & Nsa, 2018). The development of transportation and improvements in the various modes have impacted not only economic and socio-cultural activities, but also played a major role in spatial organization, spatial ordering and spatial process (Aiyegbajeje & Deinne, 2021). Inland waterway transportation plays an essential role in the socio-economic development of any nation. Inland waterways comprise navigable rivers, coastal creeks, canals and lagoons (Aderemo & Mogaji, 2010). Statistics from the National Inland Waterways Authority (NIWA) on the use of water as a means of transportation in Nigeria shows that water transportation occupies a strategic place in the economy of the nation (Aiyegbajeje & Deinne, 2021). While Aiyegbajeje & Deinne (2018) reports that it is a known fact that water transportation has been neglected for a long period by both the government and the private sector, particularly in the area of safety of passengers, Dogarawa, (2012) asserts that maritime industry has undergone serious unfortunate happenings owing to lack of attention and care to water transport despite its prominent status in movement of people and goods thereby resulting in increasing cases of accidents along waterways. Conversely, an event, or a sequence of events, which result in any of the following occurring directly in connection with the normal operation of a

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marine vessel: the death of, or serious injury to, a person; the loss of a person from a ship; the loss, presumed loss or abandonment of a marine vessel is referred to as marine accident. Marine accidents do not just happen but are caused by plethora of human related and natural factors which are identified as overloading, careless driving, political instability, piracy, militancy, negligence, turbulent weather and wreckages (Nwankwo *et al.*, 2015). Similarly, it is also noted and documented that boat mishaps are more endemic than ever before in Nigeria due to increased patronage of water transportation particularly with the inconveniences linked to road transportation (Nwankwo & Ukoji, 2015; Aiyegbajeje & Deinne, 2018). It is also documented that the amnesty program initiated in 2009 in the Niger Delta area contributed to a decrease in the number of boat accident fatalities in 2010 but the dissatisfaction in the management of the program among the different armed groups led to a resurgent of boat accident especially in the Niger Delta waterways. Consequent upon the foregoing, this study was initiated to analyze the trend of passenger vessel's accident along the waterways in the south-south region.

Materials and Methods

The study area is within the coastal and inland waterways of the Nigeria coastline of approximately 853km facing the Atlantic Ocean and lies between latitude 4° 10' to 6° 20'N and between longitude 2° 45' to 8° 35'E. The terrestrial portion of this zone is about 28,000 km^2 in area, while the surface area of the continental shelf is 46,300km^2 (Figure 1). The Nigerian coastal zone sprawls a total of nine coastal states; namely: Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Lagos, Ogun, Ondo, and Rivers State. The coastal areas stretch inland for approximately 15km in Lagos in the west to 150 km in the Niger Delta and 25 km east of the Niger Delta (Kadafa, 2012). The coastline stretches of 853km comprising inshore waters, coastal lagoons, estuaries, and mangrove especially in the Niger Delta (Lambert- Aikhionbare, et al, 1984). In spatial extent, the study is limited Rivers, Bayelsa, Delta, Cross River and Akwa Ibom states which are areas with predominant inland water transportation activities in the south-south region. The daily passengers across 10 jetties assessed from the archive of National Inland Waterways Authority (NIWA) the data for this study as displayed in Table 1. Accordingly, the sample was determined using the Taro Yamane (1964) formula for sample size determination as expressed in the equation shown below:

$$n = \frac{N}{1 + N(e)^2} \quad \ldots\ldots\ldots (1)$$

Where: e= Level of precision (0.05)

N= Population

n= Sample size

1= Constant

$$n = \frac{31083}{1 + 31083(0.05)^2}$$

$$n = \frac{31083}{1 + 31083 \times 0.0025}$$

$$n = \frac{31083}{1 + 77.71}$$

$$n = \frac{31083}{78.71}$$

n= 395

A total of 390 copies of questionnaire out of the 395 copies designed, validated and distributed among respondents comprising passengers (commuters), vessel/boat operators, regulators (NIWA & LGA) and boat makers/repairers was retrieved and used to obtain relevant information required for this study from the respondents. The analysis was done using Kruskal wallis technique.

Table 1: Population and Sample size

States	Jetties	Volume Traffic	Sample Size
Rivers	Nembe/Bile	5,719	73
	Marine Base	3,308	42
Bayelsa	Nembe	3,818	49
	Akassa	2,238	28
Delta	Ovwian	2,353	30
	Igbudu	2,044	26
Cross River	Marina	2,930	37
	Ikang	3,941	50
Akwa Ibom	Oron Beach	2,581	33
	Effiat Waterside	2,151	27
Total	**10**	**31083**	395

Source: NIWA, 2022

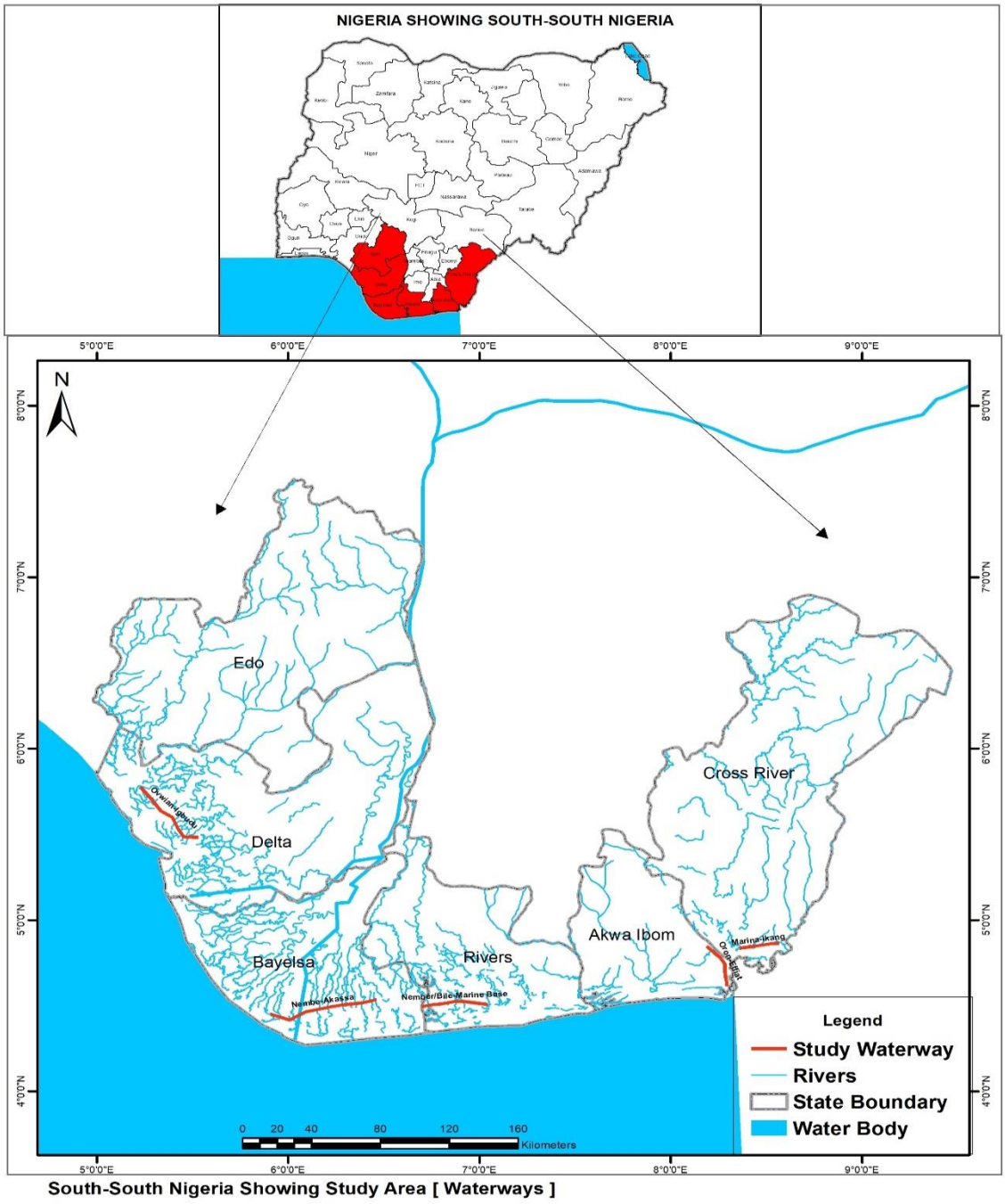

Figure 1: Study Area

Results and Discussion

Table 2: ***Socio-Demographic Details of the Respondents***

Variable	Frequency (n=390)	Percentage (%)
Sex of Respondents		
Male	248	63.6
Female	142	36.4
Age (years)		0.0
18- 35	118	29.5
36-50	162	41.5
51-65	83	21.3
Above 65	30	7.7
Educational Qualification		
None	44	11.3
Primary	135	34.1
Secondary	147	37.7

Tertiary	67	17.2
Marital Status		
Single	153	39.2
Married	188	47.4
Divorced	23	5.9
Widowed	29	7.4
Primary Occupation		
Unemployed	95	24.4
Professional Occupation	13	3.3
Skilled/Managerial Occupation	97	24.9
Manual/Partly Skilled	44	11.3
Self-employed/Trading/Commerce	136	34.1
Student	7	1.8
Others (Please Specify)	1	0.3
Years of Using the Jetty		
Less than 1year	98	25.1
2-4years	152	38.2
5-7years	54	13.8
9-12years	54	13.8
13years and above	35	9.0
Responsibility at the Jetty		
Boat Operators	34	8.7
Commuters (Boat User)	286	72.6
Official (Regulator) for NIWA	25	6.4
Official (Regulator) for LGA	21	5.4
Boat Makers/Repairer	12	3.1
Others	15	3.8

Source: Researcher's Filed Work, 2024

The demographic detail of the respondents is presented in Table 2 and it revealed that 47.4% of the respondents are married while 39.2% of them are single. The respondents are engaged in different trades of occupation, 3.3% of the population are professionals, 24.9% are skilled and occupies managerial positions, 11.2% are partly skilled and involved in manual work, and 34.1% are self-employed within the informal sector and ancillary activities in the maritime sector while 1.8% are student. The use of the jetty by the population span into different years, 25.1% of the respondents have used the jetty for less than one year, 38.2% have used the jetty for 2 to 4 years, 13.8% have used the jetty for 9 to 12 years and 9% have used the jetty for more than 13 years. The data presented in Table 2 show that 8.7% of the users of the jetty are boat operators, 72.6% are transporters, 6.4% are officers of NIWA, 5.4% are officers of the LGA, 3.1% are involved in the making, repair and maintenance of boats, and 3.8% are involved in other ancillary activities.

Table 3: Nature and Frequency of Passenger's Vessel Accidents

Variable	Frequency (n=390)	Percentage (%)
Passenger Vessel Accidents (Often)		
Never	-	-
Occasionally	101	25.9
Often	252	63.8
Very Often	40	10.3
Consequences of Passenger Vessel Accidents		
Fatal	202	51.8
Non-Fatal	45	11.5
Damage	146	36.7
Types of Vessels involve in Mishaps		
Passenger Boat	146	36.7
Cargo Boat	86	22.1
Oil Tanker	45	11.5
Fishing Boat	98	25.1
Others	18	4.6
Nature of Vessel Mishaps		0.0
Human Factors	175	44.1
Nature Factors	119	30.5
Mechanical Factors	99	25.4
Collision	40	10.3
Overloading	118	29.5

Over-speeding	143	36.7
Negligence	65	16.7
Other	27	6.9
Common Natural Factors of Vessel Mishaps		
Flooding	85	21.8
Poor Visibility	57	14.6
Shallow Draught	96	24.6
Storm/Wind	145	36.4
Underwater Debris	8	2.1
Stability Failure	2	0.5
Common Mechanical Factors of Vessel Mishaps		
Engine Malfunction	58	14.9
Fire Explosion	81	20.8
Navigator Failure	147	36.9
Equipment Failure	95	24.4
Other	12	3.1

Source: Researcher's Filed Work, 2024

The data presented in Table 3 show the nature and frequency of passengers' vessels accidents in Nigerian inland waterways. All the respondents reported that they have experienced accidents in their use of the waterways for transportation and their responses shows variation in their experiences. 25.9% of the respondent's experiences accidents occasionally, 63.8% of the users' experiences accidents often while 10.3% of the respondent's experiences accidents very often. The experiences of the users of the waterway reflect the nature and operations in the maritime transport sector which exposes users to frequent accidents. There is also conspicuous variation in the severity of accidents experienced by the users and the record in Table 3 show that 51.8% of the accident cases are fatal, 11.5% are not fatal and 36.7% of the cases are damaging. In Table 3, the types of vessels used in the waterways transportation system are also reported whereas 36.7% of the vessels are passenger boat, 22.1% of the vessels are cargo boats, 11.5% are oil tankers, 25.1% are fishing boat while other medium used for inland waterways navigation is 4.6%. Again, the causes of vessel mishap shows that human factors (44.1%), natural (30.5%) and mechanical (25.4%). The human factors that induces vessel mishap are diverse but majorly overloading and over speeding with 29.5% and 36.7% respectively. Collision with other vessels recorded 10.3% occurrences and negligence by the actors in the sector recorded 16.7%, but beyond the human factors reported as indicated in the table, 6.9% are attributed to other factors. The natural causes of vessel accident in inland navigation are flooding 21.8%, poor visibility 14.6%, shallow draught 24.6%, storm and wind 36.4%, underwater debris 2.1% and stability failure 0.5%, common mechanical factors are engine failure 14.9%, fire explosion 20.8%, navigator failure and lack of expertise 36.9% and equipment failure 24.4%. The study shows that the vessel accident in inland waterways transportation in the south-south region is severe in some cases and mild in other cases. Direct collision with other vessels in the waterways is common. When there is direct collision, the accident is fatal, it leads to death of passengers and loss of properties. In some cases where death is not recorded, the injuries incurred are severe and properties are lost. The reports in this study on the severity of the accident in the waterways transportation is consistent with Adeleye et al. (2015) when they reported that poor response to accident in the water ways transportation system increases losses incurred. Ademiluyi, Afolabi & Fashola. (2016) posit that when rescue operation is not timely, and when medical service is not readily available, the tendency to record fatality become high. Beyond direct collision between vessels in the waterways, poor visibility has also been adduced to vessel accident in the waterways, poor adherence to guidelines on the dynamism of weather and the lack of expertise to understand meteorological parameters is common among boat operators in the region which is consistent with the reports by Aderemo & Mogaji, (2010). On the lack of expertise that characterize the maritime sector where informality is rife. Akali, & Idoko. (2010) recognized sudden malfunction of equipment that is not anticipated as a major cause of vessel accident, in such cases when maintenance has been duly conducted, sudden occurrence of failure is usually fatal as rescue operation is not always available. This is consistent with the findings of this study on the severity of accidents and the fatality recorded due to the poor adherence to the use of life jacket. The outcome of this study on the rising cases of maritime accident in the south-south region is also consistent with the reports of Akpudo, (2021) on the yearly increase in maritime accident globally. The author posits that non-adherence to safety rules, the use of unregistered and not certified vessels and poor adherence to international safety protocol as some of the causes of vessel accidents. Nigerian is currently faced with challenges in the transportation sector such as traffic jam and high cost of energy but there seem to be limited interest in waterways transportation due to the unattractive nature. It is reported by Andrei et al. (2015) that the problems associated with road transportation has manifested in renewed interest in inland waterways navigation, but there are challenges that impedes the growth of the maritime economy. Studies have not been conducted to report the variation in the severity between road and waterways accidents, but Chauvin (2011) argue that accident in the waterways is always fatal and in many cases it is difficult to find help. Recent observation revealed that accident occurred most times along the waterways at night after the officers regulating the sector have closed. This practice of regulatory officers closing from work when operation is still ongoing do not meet global best practices and need to be urgently addressed.

Table 4: Casual factors of passenger's vessel accidents along south-south region water ways

SN	Causal Factors Associated with Passenger Vessel Accidents	SA(%)	A(%)	D(%)	SD(%)	U(%)	Total (%)	WM
1	Negligence to the occupational safety and healthy procedure	145 (37.2)	186(47.7)	33(8.5)	19(4.9)	7(1.8)	390	4.1
2	Fatigue on the part of the operator of the passenger vessels	109(27.9)	149(38.2)	73(18.7)	46(11.8)	13(3.3)	390	3.8
3	Carelessness or recklessness under commercial pressures	172(44.1)	143(36.7)	45(11.5)	26(6.7)	4(1)	390	4.2
4	Overconfidence of the operator	146(37.4)	169(43.3)	38(9.7)	35(9)	2(0.5)	390	4.1
5	Misinterpretations of radar information which cause collision	76(19.5)	94(24.1)	104(26.7)	95(24.4)	21(5.4)	390	3.3
6	Poor attention to weather condition leading to poor visibility	109(27.9)	118(30.3)	96(24.6)	64(16.4)	3(0.8)	390	3.7
7	Lack of knowledge and experience	46(11.8)	59(15.1)	143(36.7)	109(27.9)	33(8.5)	390	2.9
8	Over speeding and Over loading	132(33.8)	142(36.4)	54(13.8)	46(11.8)	16(4.1)	390	3.8
9	Night sailing without adequate light	114(29.2)	142(36.4)	56(12.4)	67(17.2)	11(2.8)	390	3.7
10	Lack of enforcement of safety regulations by Government agencies	179(45.9)	184(47.2)	14(3.6)	12(3.1)	1(0.3)	390	4.4
11	Poor maintenance	114(29.2)	123(31.5)	104(26.7)	42(10.8)	7(1.8)	390	3.8
12	Bad weather condition and High Turbulence	141(36.2)	132(33.8)	62(15.9)	45(11.5)	10(2.6)	390	3.9

Source: Researcher's field work, 2024

NB: SA Strongly Agree, A-Agreed, D-Disagreed, SD-Strongly, Disagreed, U-undecided

The data presented in Table 4 show the dominant causal factors of passenger's accident in major water ways in the south-South region. Evidently, there are multiple causes of accident but their impact are in different magnitudes. Passengers and actors in the sector agreed that negligence to occupational safety and healthy procedure is a major cause of vessel accidents along the water ways in the area. The data in Table 4 show that 27.9% strongly agreed that fatigue on the part of the vessel operators is a major cause of vessel accident. This can be adduced to continuous work without taking time to rest, and lack of assistance during long trips within the waterways. In cases where trips extend into the night, there is the tendency to become sleepy and this is of immense consequences. The potentials in maritime transportation in the south-south region have not been fully optimized. In spite of the recognition in the literature that maritime transport is more affordable and provides the medium for haulage of large goods from one place to another, its use is still limited by enormous challenges (Chauvin, 2011). The outcome of this study on the risk associated with maritime transport in the south-south region is consistent with Anyanwu (2014). The study reported human, natural and mechanical factors as some of the broad categorization of the factors that causes maritime accidents. This is consistent with Anyanwu (2014) that risk in the maritime industry cannot be eliminated completely due to the import of natural factors that cannot be completely simulated and controlled, the human factors such as negligence and poor adherence to safety guideline represents major setback. A similar study conducted by the US department of transport also reported that human error accounts for 60 to 80% of maritime accidents and the import of natural events that causes accidents can also be linked to negligence and refusal to adhere to standards on how to respond to natural disasters. However, that argue that the failure of actors in the sector to conduct qualitative and quantitative assessment of the indicators of risks tend to expose passengers to different form of disaster. The outcome of this study is also consistent with Eliopoulou et al. (2016) on the lack of maintenance of vessels, poor adherence to the use of life vests and replacement of very old vessels. The outcome of this study is also consistent Akpudo (2021) on the spate of over loading, over speeding which tend to contribute to the accidents in the waterways. The outcome of this study is in harmony and consistent with Akpudo (2021) when he reported that there is rising cases of ferry accidents in Nigeria due to increasing interest and patronage for water transportation, the study reported loss of lives and properties worth billions. He also reported that 30% of the cases of accident in waterways transportation is caused by poor weather visibility and 25% are unexplained.

Table 5: Temporal variation of passenger's vessel accidents (2008-2023)

Years	Rivers	Bayelsa	Delta	Akwa Ibom	Cross River	Total
2008	10	4	13	4	15	**46**
2009	8	6	10	5	6	**35**
2010	9	7	9	2	8	**35**
2011	9	8	7	11	12	**47**
2012	16	3	11	8	8	**46**
2013	12	4	8	14	16	**54**
2014	7	18	5	6	13	**49**

2015	4	7	11	9	6	**37**
2016	9	7	10	10	17	**53**
2017	13	5	11	16	11	**56**
2018	15	16	14	9	11	**65**
2019	11	9	16	7	13	**56**
2020	14	5	4	7	10	**40**
2021	12	4	8	5	11	**40**
2022	16	4	20	14	13	**67**
2023	19	10	5	10	9	**53**
TOTAL	**184**	**117**	**162**	**137**	**179**	**779**

Source: NIWA, 2024

The data presented in Table 5, figures 2 and 3 show the temporal variation in the nature and pattern of passenger's vessels accident in the south-south region. The data show that there is spatial difference in the occurrences of accidents in 2008, River state recorded 10 cases, Delta 13, Akwa Ibom 4, and Cross River 15 which amounted to 46 cases of accidents in 2008. The cases of accidents reduced in 2009 to 35 cases in the region, it is evident that rivers state recorded a slight reduction from 10 cases in the previous year to 8 cases in 2009, but this is not the cases with Bayelsa where there was increase from 4 in 2008 to 6 in 2009. The case of cross river state recorded remarkable reduction from 15 cases in 2008 to 6 cases in 2009. The data show that there is intermittent increase and decrease in the occurrences of accident in different years and in different states in the south-south region, but curiously the year 2022 recorded the highest cases of vessel accident with 67 cases, while the year 2023 recorded 53 which show that recent years have recorded more vessel accidents.

Figure 2: Annual Accident Record in the study area from 2008-2023

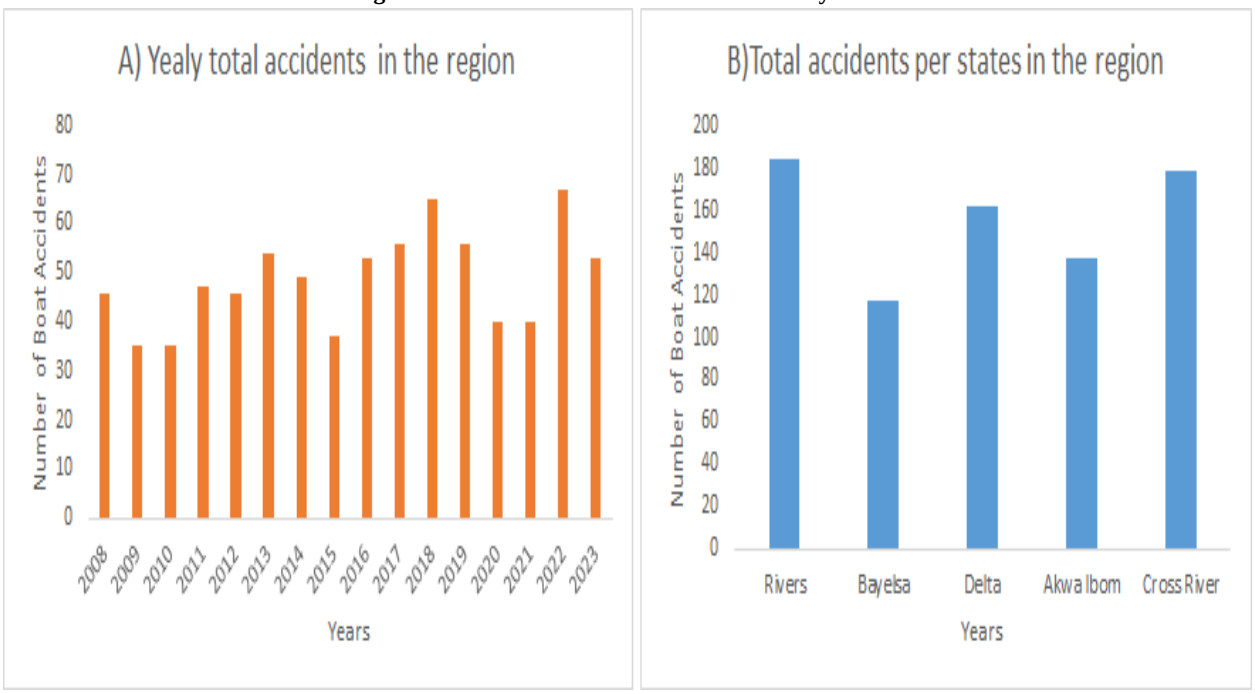

Figure 3: Total Annual Accident Record in the study area from 2008-2023 and total accidents in the individual states 2008-2023

Table 6: Challenges Associated with the Operation and Management of Passenger Vessel Accidents

SN	Challenges Associated with the Operation And Management Of Passenger Vessel Accidents	SA(%)	A(%)	D(%)	SD(%)	U(%)	Total (%)	WM
1	Lack of enforcement of legislation causes passenger boat/vessel accidents	115(29.5)	169(43.3)	63(16.2)	33(8.5)	10(2.6)	390(100)	3.9
2	Low rate of lifejacket wears is a major challenge to prevent drowning	163(41.8)	175(44.9)	24(6.2)	24(6.2)	4(1)	390(100)	4.2
3	Lack of enforcement of safety regulations by Government agencies causes low follow-through on safety procedures	144(36.9)	163(44.9)	37(9.5)	44(11.3)	2(0.5)	390(100)	4.0
4	Boat user refusal to wear their lifejacket due to ignorance	23(5.9)	54(13.8)	148(37.9)	151(38.7)	14(3.6)	390(100)	2.8
5	Inadequate knowledge of boat operators about the importance safety procedure	157(40.3)	142(36.4)	43(11)	37(9.5)	11(2.8)	390(100)	4.0
6	Inadequate introduction of improve technology and appliances in the operation of passenger vessels	166(42.6)	179(45.9)	15(3.8)	24(6.2)	6(1.5)	390(100)	4.2
7	Lack of investment from the private organizations	51(13.1)	89(22.8)	139(35.6)	98(25.1)	13(3.3)	390(100)	3.2

Source: Researcher's field work, 2024

The problems associated with the management and operations of passengers' vessels in the south-south region is presented in Table 6 and it is clear from the observation that 29.5% of the respondents strongly agreed that lack of enforcement and legislation contribute to the frequent occurrence of accident in the region. Also evident is that the use of life jackets to prevent drowning is low, 41.8% of the population reported that many of the passengers and the operators of the vessels do not use life vest which increases cases of fatality and make rescue operations complex. The poor enforcement of safety guidelines by the officers of the relevant agencies of government was reported as a major impediment to improving safety of passengers and operators in the sector. Also very critical

is that many of the boat operators do not understand the safety rules in maritime transport, the use of old boats, with old and overused engines poses serious risk in the sector. Maritime activity is without any doubt, a risky activity, and maritime disasters, that had happened through the years and which will happen in an inevitable way are due to the complex environment of vessel operation (Anyanwu, 2014). Anyanwu (2014) reported that 185 fatalities of accidents in the maritime sector occurred in the European Union in the year 1995. But significant progress has been made to improve technology in the sector, but this has not reduced the high proportion of maritime accidents in developed and developing countries. The case of developing countries such as Nigeria is more complex and problematic due to the poor adherence to laws and failure of relevant agencies to improve compliance. Ikeagwuani & John (2013) argue that when technology is improved, and the human errors such as willful negligence and lack of expertise are not addressed, the tendency to incur accident is high. The utility of Kruskal Wallis test revealed variation in the enforcement of laws to regulate maritime transport across different states in the south-south which is consistent with Anyanwu (2014) tat reported lack of unified standard for essential equipment, oily water separators when there is spillage in the water ways, voyage data recorders and lifeboat launching equipment. The author argues that until regulatory and industry bodies are able to agree on a common standard, it is the actors in the sector that would suffer the challenges reported in the literature. Anyanwu (2014) posit that passengers' boat accident is prevalent in the coastal and interior areas where some communities do not have access to road transportation. While commercial passenger's boats have been implicated as the most successful modes of transportation, the challenges bedeviling the sector are numerous. The Nigerian waterways system is connected to approximately 880 kilometres of Intracoastal waterways from Lagos via Warri, Port Harcourt, and Calabar. According to the NIWA, there is roughly 3000 km of undeveloped although developable and navigable inland waterways. The outcome of this study is consistent with Ademiluyi et al. (2016) when they reported that the government have not made sufficient investment to fully optimize the potentials in the sector. Ademiluyi et al. (2016) reported that overcrowding of boats, jetties, canoes characterized the waterways transport in Nigeria. Despite the potential of the country's inland waterways, Nigeria has a lengthy history of neglect by both the government and the private sector. Inland water transport systems have received little attention. This is partly due to policy inconsistency, minimal private sector involvement, and disagreements among authorities involved inland water transport management in Nigeria. Aderemo & Mogaji (2010) reported that the death rates in the use of boats and ferry accidents is high in Nigeria. Akali, & Idoko (2010) reported that the high cost of transportation in the inland waterways is due to poor investment in the sector. Akali, & Idoko (2010) reported that the waterways police officers are not properly equipped, and many of their boats are rickety which tend to impede regulation of over speeding and overloading. Water transportation has come to play a pivotal place in the nation's economy, especially given the complexities of road transportation. Aderemo & Mogaji, (2010) reported that mishaps involving boats are more common than ever in Nigeria owing to the growing use of water transportation, although water transport is one of the safest modes of transportation when compared to road transport, the safety and utilization of commercial passenger boats in developing countries still need to be improved. Passenger boat safety is an issue in most poor countries, and Nigeria is no exception, as seen by the frequency of recent commercial boat disasters.

Table 7: Spatial variation in the frequency of passenger's vessel accidents along the major water ways in the study area

Test Statistics[a,b]

	Accidents
Chi-Square	14.004
Df	4
Asymp. Sig.	.007

a. Kruskal Wallis Test

. Grouping Variable: Area

The calculated value of the Kruskal Wallis test (0.007) is less than the sig value of 0.05 which means that there is no significant variation in the occurrences and frequency of passengers' vessel accident across different states in the South-South region. This study found similarity in the problems confronting vessel accidents in the south-south region, but there is a difference in the enforcement of laws due to the policy thrust of the local authorities in the states. The outcome of this study is in agreement with the work of Oyinkepreye & Robert (2016) when they reported that environmental factors such as poor visibility, and technical factors are the major causes of accident in the marine ecosystem. They also reported variation in the annual and monthly occurrence of vessel mishaps across different water bodies. The variations are due to the differences in the nature of the waterways, the operational modalities and the enforcement of laws in the sector. The difference in weather characteristics also poses serious variation. Recent years have recorded frequent accident in the Nigerian waterways which are adduced to different factors. The study conducted by Oyinkepreye & Robert (2016) reported that the rising cases of accidents in the waterways in Nigeria are a testament of the poor state of the sector and the urgency needed to reform the sector. They reported that the full potentials in the blue economy cannot be optimized if the human, natural and mechanical issues are not addressed, but in many cases, the officers of the relevant agencies of government tend to focus on the symptoms of the problems and not the underlying causes of the problems. Defaulters of the laws governing maritime transportation are levied, but the facilities that would engender professional conduct are not provided. Oyinkepreye & Robert (2016) reported offshore accidents that caused serious damage to the accident due to the volume of petroleum products carried through the waterways. Ishak et al. (2019) reported that many people on adventures, recreation and business trips along the major waterways in Nigeria have recorded negative experiences that tend to reduce patronage in the sector. However, there are communities in the south-south region that rely solely on waterways transport to traverse their environment for trade, and for work.

Conclusion and Recommendations

Waterways transportation in the south-south region is characterized with different problems that can be categorized under natural, human and mechanical factors. The natural factors are weather related such as poor visibility and the turbulence during high tides, other natural causes include the seasonality of some of the rivers as seen in Bedeseigha in Delta state. The study also shows that the different types of vessels used in the waterways

transportation along the waterways in the area include passenger boats, cargo boats, oil tanker, fishing boats and other medium for waterways navigation. The study further revealed the spatial variation in the occurrences of accidents along the waterways across the area. Although all the states have recorded high occurrences of vessel accidents and the causes of the accidents are varied. The last five years recorded the highest number of vessel accident in the region which shows that there is no improvement in the sector to engender efficiency. Consequently, compulsory use of life jackets for both operators and passengers, periodic conduct of integrity test on vessels used for inland waterways transportation, constant safety campaigns and enforcement of regulatory laws by relevant authority were highly recommended.

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