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CAUSES OF BOAT MISHAPS IN MOKWA LOCAL GOVERNMENT AREA, NIGER STATE

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Abstract

Boat mishap remains a major challenge limiting the efficiency of inland water transportation, especially in rural areas. This study investigated the causes of boat mishap in Mokwa Local Government Area (LGA) of Niger state, Nigeria. The study adopted a quantitative research design utilising questionnaire as instrument of data collection. 115 boat operators served as the population of the study, out of which 30 operators selected from four major inland water transport (IWT) ports namely; Gbajibo, Poluwaya, Bukka-Gungu-Zaki, and Gbajibo Modu were sampled. Stratified and accidental sampling techniques were adopted and responses were analysed using descriptive statistics such as mean and rankings. Secondary data sourced from Niger State Ministry of Transport (NSMT) were further analysed descriptively to compliment information sourced from operators. The findings revealed that adverse weather condition, overloading, poorly marked navigation routes as well as use of old and poorly maintained boats were the major causes of boat mishaps. The study further established that boat mishaps in the area are often severe, involving high casualty rates and predominantly affecting wooden boats. The study recommended strict enforcement of safety laws, provision and enforced use of life jackets as well as routine dredging of waterways to remove obstructions.

Keywords: Boat mishaps, inland water transport, Mokwa, accidents, safety

1. INTRODUCTION

Boat mishaps have increasingly become a critical safety and operational concern within inland water transport (IWT) systems, particularly in developing countries where waterways serve as essential mobility corridors for both passengers and goods. Inland water transport plays a significant role in enhancing accessibility, supporting livelihoods, and facilitating regional trade; however, its effectiveness is often undermined by frequent accidents and safety failures. Empirical evidence suggests that these mishaps are not random occurrences but are largely attributable to a combination of human, technical, environmental, and institutional factors. For instance, Jones et al. (2024) identified human error, poor vessel conditions, adverse weather, navigational difficulties, and weak regulatory enforcement as major causes of inland waterway accidents in Tanzania. Similarly, Ladele (2025) observed that safety lapses such as overloading, lack of life jackets, and poor maintenance culture significantly increase the risk of boat accidents in Lagos State, Nigeria.

In the Nigerian context, inland waterways remain underdeveloped despite their vast potential, with safety concerns further limiting their utilisation. Studies have consistently highlighted infrastructural deficiencies, poor maintenance practices, and inadequate funding as key contributors to operational inefficiencies and accident risks. Onah and Ojekunle (2025) noted that irregular boat schedules, limited availability of vessels, and insufficient safety equipment across North Central Nigeria undermine the reliability and safety of water transport systems. In a related study, Ahmad et al. (2022) found that poor maintenance culture, lack of financial support for operators, and absence of effective regulatory control significantly affect the safety of inland water transport in Borgu Local Government Area, Niger State. These findings are further supported by Bassey and Nsa (2018), who identified inadequate infrastructure, lack of dredging, and poor maintenance as persistent challenges hindering the development and safety of inland waterways in the Calabar River.

Beyond infrastructural and operational deficiencies, environmental and socio-cultural factors also play a crucial role in the occurrence of boat mishaps. Seasonal fluctuations in water levels, presence of obstructions, and extreme weather conditions can increase navigational hazards and accident risks (Ahmad et al., 2022). Additionally, weak enforcement of safety regulations and limited awareness among operators and passengers contribute to unsafe practices, thereby exacerbating accident occurrences. The study by Okon et al. (2023) further emphasised that inadequate investment in navigational aids, poor public awareness, and lack of maintenance facilities hinder safe and efficient inland water transport operations.

Despite the growing body of literature on inland water transport, there remains a need for context-specific investigations into the causes of boat mishaps, particularly in riverine communities where dependence on water transport is high. Understanding the interplay of operational, infrastructural, human, and environmental factors is essential for developing targeted interventions that can enhance safety and reduce accident rates. Therefore, this study seeks to examine the causes of boat mishaps in Mokwa LGA with a view to providing empirical evidence that will inform policy formulation, improve safety practices, and enhance the overall performance of inland water transport systems.

2. LITERATURE REVIEW

2.1. Causes of Boat Mishaps

Boat mishaps on Nigeria's inland waterways have become a recurring tragedy, claiming hundreds of lives annually and raising serious concerns about safety and operational standards within the inland water transport (IWT) sector (Justace et al., 2024). These mishaps are caused by a complex interplay of human, technical, environmental, and institutional factors, with varying frequencies across regions and seasons. Although precise national statistics are difficult to obtain due to inconsistent reporting, studies and media reports suggest that boat accidents occur frequently in riverine areas such as Niger, Lagos, Kebbi, Bayelsa, and Cross River States, particularly during festive periods and farming seasons when water transport activities peak.

2.1.1. Overloading

A leading cause of boat mishaps is overloading, which occurs when operators exceed the vessel's capacity in terms of passengers or cargo. This practice is common due to the limited number of boats available in many communities, pressure to maximise profits, and inadequate monitoring by regulatory authorities. When boats are overloaded, their stability is compromised, increasing the likelihood of capsizing, especially when navigating through turbulent waters or strong currents. Adepoju and Bekesuomowei (2021) noted that overloading was a major contributing factor in over 60% of reported boat accidents in the Niger-Benue inland waterways between 2010 and 2018.

2.1.2. Poor maintenance of boats and equipment

Poor maintenance of boats and equipment is another significant cause. Many boats in Nigeria's inland waterways are constructed locally using wood and are often not subjected to regular safety inspections or repairs. In many cases, vessels operate without navigation lights, proper steering mechanisms, or functional engines, thereby increasing the risk of mechanical failure while in transit (Aderamo and Mogaji, 2010). The use of old or faulty engines, in particular, has been identified as a recurrent issue, often leading to breakdowns mid-journey, sometimes with fatal consequences.

2.1.3. Lack of Safety Equipment and Non-Compliance with Safety Standards

Another major challenge is inadequate safety equipment as well as non-adherence to safety standard. Life jackets, emergency buoys, fire extinguishers, and first aid kits are either absent or insufficient on most boats. Even when life jackets are provided, passengers often refuse to wear them due to discomfort or ignorance about their importance. According to the Adepoju and Bekesuomowei (2021), less than 40% of boats inspected during random spot checks in 2020 had the required number of life-saving appliances.

2.1.4. Human error

Human error also plays a central role in many boat accidents. Inexperienced or untrained boat operators often embark on trips without adequate knowledge of the weather, water current behaviour, or navigational routes (Okon et al., 2023). Reckless driving, poor judgment under pressure, and alcohol consumption while operating boats have all been identified in accident investigations (Bassey and Nsa, 2018). The lack of formal training and certification systems for boat operators in many states further compounds this challenge.

2.1.5. Environmental and weather-related factors

High tides, whirlpools, heavy rainfall, and sudden storms can destabilise boats, especially those without proper shielding or navigation equipment. In the dry season, low water levels can expose submerged logs or rocks that damage boats, while in the rainy season, swollen rivers and strong currents pose greater risks. Adepoju and Bekesuomowei (2021) reported an increase in boat mishaps between June and September, coinciding with the peak of the rainy season.

2.1.6. Institutional Failures

Poor regulation as well as weak enforcement of waterway regulations have exacerbated the frequency and severity of boat mishaps. Despite the presence of regulatory agencies like NIWA, enforcement of safety standards and routine inspections remains inadequate due to understaffing, corruption, and logistical challenges. Jurisdictional conflicts between federal and state waterway authorities further weaken governance and oversight (Okon et al., 2023).

2.2. SHEL Model

The SHEL model, developed by Elwyn Edwards in 1972 and improved by Hawkins in 1975, is a systems-based model used to analyse human factors and their contribution to accidents in complex operational environments. The conceptualisation of the human operator (Liveware) as the central element in interactions with four key components: Software (procedures, rules), Hardware (equipment and tools), Environment (physical and operational conditions) and other Liveware (human interactions). Its fundamental assumption is that accidents happen when there is an incompatibility or inappropriate interface between the human element and any of these elements. The model was a standard tool in safety management adopted by the International Civil Aviation Organization (Udartseva, 2017) and is often useful in identifying both active failures and latent conditions before they can result in accidents. The model also acknowledges that human performance is effected by both ergonomic design and clarity of procedures,

environmental stressors and interpersonal dynamics (Hawkins, 1993). According to Keum and Yoon (2018), human component is the most flexible, but vulnerable component, and all other components of the system need to be aligned properly with capabilities and limitations of human. In turn, the SHEL model highlights that the interactions across the system, not the individual human error, are core to understanding and preventing accidents, making it highly applicable to the analysis of the causes of boat mishaps and safety failures in inland water transport systems

3. METHODOLOGY

The study adopted a quantitative research design with a descriptive orientation, relying on both primary and secondary data. Primary data were gathered using structured questionnaires administered to operators of IWT in Mokwa LGA. The study population was 115 boat operators in 4 major inland water transport (IWT) ports, which are namely Gbajibo, Poluwaya, Bukka-Gungu-Zaki, and Gbajibo Modi. A sample size of 30 operators was decided using Taro Yamane formula and proportionately allocated to the sampled ports using proportional allocation formula, resulting in 8 operators of Gbajibo, 5 of Poluwaya, 8 of Bukka-Gungu-Zaki and 9 of Gbajibo Modi. The sampling technique used was multistage sampling, where stratified sampling was first used to divide the operators into groups based on the location of their ports and then accidental sampling was used to select the respondents in each group. The secondary data on accident frequency, severity, causes, and casualties were collected from NSMT. Mean score analysis and ranking techniques were used in the analysis of primary data to establish the relative effect of the identified causes of boat mishaps based on the responses of the operators. Secondary data were descriptively analysed by interpreting tabulated data to reveal trends and patterns in the occurrence of accidents. Tables were used to present data to improve the clarity of the data and to enable comparisons of findings.

4. RESULTS AND DISCUSSION

Causes of Boat Mishaps

Boat mishaps are caused by a number of factors. These factors are human, environmental or otherwise. Table 1. presents information on the causes of boat mishaps in Mokwa LGA. The results from the Table shows that poor weather condition recorded the highest mean score (Mean = 4.55; SD = 0.452), indicating that operators perceive adverse weather as the most significant contributor to boat mishaps. This was closely followed by poorly marked navigation routes (Mean = 4.50; SD = 0.798) and the use of old, weak or poorly maintained boats (Mean = 4.45; SD = 0.452). These high mean values suggest strong agreement among operators that environmental and infrastructural deficiencies play a critical role in accident occurrence.

Similarly, poor visibility due to fog (Mean = 4.32; SD = 0.289) and overloading (Mean = 4.15; SD = 0.452) were rated as major contributors. The relatively high mean for overloading reinforces earlier findings that capacity violations are common within the system. Collision with submerged objects (Mean = 3.70; SD = 0.522) and reckless navigation (Mean = 3.17; SD = 0.389) recorded moderate mean scores, indicating that navigational behaviour and waterway obstructions also contribute, though to a lesser extent compared to environmental factors.

On the other hand, communication failure (Mean = 2.50; SD = 0.674), drunk driving (Mean = 2.30; SD = 0.050), and poor safety culture (Mean = 2.18; SD = 0.669) were rated relatively low. This suggests that operators do not strongly perceive these behavioural and institutional factors as primary causes of mishaps. Notably, sudden engine failure recorded the lowest mean score (Mean = 1.20; SD = 0.982), implying that mechanical breakdown is not widely considered a significant contributor within the study area.

Overall, the ranking indicates that environmental conditions and infrastructural inadequacies (weather, visibility, navigation markings, boat condition) are perceived as the dominant causes of boat mishaps, while mechanical and behavioural factors are viewed as less significant. This perception pattern may reflect operators' lived experiences within riverine environments, although it may also suggest possible underestimation of human-factor risks.

Table 1: Causes of Boat Mishaps

Causes of Boat Mishap	Mean	Std. Deviation	Rank
Poor weather condition	4.55	0.452	1
Poorly marked navigation route	4.50	0.798	2
Use of old, weak or poorly maintained boats	4.45	0.452	3
Poor visibility due to fog	4.32	0.289	4
Sudden Engine Failure	4.27	0.862	5
Overloading	4.15	0.452	6
Collision with submerged objects	3.70	0.522	7
Reckless navigation	3.17	0.389	8
Communication failure	2.50	0.674	9
Drunk driving	2.30	0.050	10
Poor safety culture	2.18	0.669	11

Source: Author's Survey (2026)

An examination of secondary data obtained from official records presented in Table 2 reveals seven major boat mishaps recorded between 2014 and 2024 within Mokwa LGA and adjoining areas along the Rivers Niger and Kaduna. All the recorded incidents involved wooden boats, which directly supports the earlier finding that 100% of operators in the study area use wooden engine boats. This uniformity in vessel type suggests structural exposure to similar risk conditions across incidents.

Table 2. Causes and Severity of Boat Mishaps in Mokwa LGA

S/ No	Date	Location	LGA	No. Of victims	No of death	Time of the incident	Types of boat involved	Cause of accident
1	12th April, 2014	Lenfa	Mokwa	15	5 died (1 female 4 male)	-	Wooden made boat	-
2	30th August 2019	Wuya	Lavun/ Mokwa	4 people	3 died (3 male)	-	Wooden made boat	River turbulence
3	10th October, 2022	Gbara	Mokwa	48 people	11 Dead 37 survive	Evening	Wooden made boat	Windstorm and over float
4	10th Sept. 2023	Gbajibo	Mokwa	113	31 dead 82 survived	Morning	Wooden made boat	Stump
5	18th July, 2024	Gbajibo	Mokwa	Unknown	3 women	11am morning	Wooden boat	Stump
6	22nd July, 2024	Gbajibo (Tungan Mallam Tanko)	Mokwa	Unknown	2 women	5pm evening	Wooden boat	Overload/speed
7	1st Oct., 2024	Gbajibo	Mokwa	Over 300	48 confirmed dead,	8:40pm Night	Wooden boat	Overload

	60 survived, 240 missing

Source: Niger State Ministry of Transport

In terms of magnitude of casualty, the most severe incident occurred on 1st October 2024 at Gbajibo, involving over 300 passengers, with 48 confirmed deaths, approximately 60 survivors, and about 240 persons reportedly missing. Similarly, the 10th September 2023 incident at Gbajibo involved 113 passengers, resulting in 31 deaths. Another major accident occurred on 10th October 2022 at Gbara (Mokwa), where 48 persons were involved and 11 deaths were recorded. These high-fatality events indicate that boat mishaps in the area are often mass-casualty occurrences rather than isolated minor incidents.

The documented causes in the secondary data strongly corroborate the ranked perceptions of operators. Environmental factors such as windstorm, river turbulence, and likely poor visibility were identified in the 2019 and 2022 incidents. These align directly with the highest-ranked perceived causes: poor weather conditions (Mean = 4.55) and poor visibility due to fog (Mean = 4.32).

Infrastructure-related and navigational hazards were also prominent. The 2023 and 2024 Gbajibo incidents were attributed to stumps, indicating collision with submerged objects. This supports the operators' ranking of collision with submerged objects (Mean = 3.70) and poorly marked navigation routes (Mean = 4.50) as significant contributors. The recurrence of stump-related accidents particularly suggests inadequate waterway clearing and poor navigation route marking along the River Niger corridor.

Human-factor causes were equally evident. The 22nd July 2024 and 1st October 2024 incidents explicitly cited overloading, with one case also involving speed. Overloading had earlier been ranked fifth (Mean = 4.15) in perceived contribution. The 2024 October incident, involving over 300 passengers in a wooden boat, provides strong empirical validation that overloading is not merely perceived but is an actual recurring cause of fatal mishaps in Mokwa LGA.

Temporal patterns show that incidents occurred during morning, evening, and night hours (including 8:40 pm), indicating that accidents are not restricted to a particular time of day. However, reduced visibility at night may indirectly reinforce the significance of environmental and navigational challenges. These findings are in agreement with the findings of Justace et al. (2024), Ogboeli et al. (2024) and Adepoju and Bekesuomowei (2021) who identified human error, environmental factors and administrative challenges as major factors causing boat mishaps.

5. CONCLUSION AND RECOMMENDATIONS

Boat mishap remains a major challenge facing inland water transportation in Mokwa LGA. The study concluded that environmental conditions, infrastructural deficiencies, and operational practices are the major determinants of boat mishaps in Mokwa Local Government Area. The operators cited adverse weather, unmarked navigation routes, use of weak or badly maintained boats as the most notable causes. These perceptions were further supported with secondary data were causes of accidents were noted to be windstorms, river turbulence, submerged objects, and overloading. The results also showed that boat accidents in the region are usually severe, which involves huge numbers of passengers and ends up with high casualties, especially considering the prevalence of wooden boats. Although environmental factors contribute significantly, man-made factors like overloading and non-compliance with safety measures are also critical factors.

The study recommends routine dredging of waterways to remove obstructions and navigation hazards, vessel standardisation, intensification of monitoring by relevant regulatory agencies and enforcement of

safety rules, in order to ensure compliance with carriage capacity, and boat quality. Government should also prioritise the provision of life jackets and enforcement of its usage in order to minimize casualties during mishaps.

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