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Assessing the Factors Influencing Flood Preparedness Among Business Owners in Lagos Island, Nigeria

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Abstract: This study explores the relationship between factors influencing flood preparedness among business owners in Lagos Island, Nigeria, focusing on who prepares and how they mitigate disaster risks. Data was collected from 325 business owners in flood-prone areas, and Chi-Square hypothesis testing was used to analyze the significance of trust in flood alerts on preparedness. Findings reveal a significant relationship between trust in flood alerts and preparedness levels, with key factors such as flooding causes and duration of residence in floodplain areas influencing readiness. The analysis shows that 70% of respondents had limited access to flood alerts, emphasizing the need for non-technical communication approaches, such as translations, to accommodate cultural diversity. With a p-value of 1.3628 (greater than $\alpha = 0.05$), the study confirms the impact of trust on preparedness but notes limitations in generalizing findings to areas with less cultural diversity. The research offers strategic insights for disaster management agencies, highlighting the importance of trust-building through non-technical communication to enhance flood preparedness among business owners.

Keywords: *Business owners, Disaster risk, Flood, Preparedness, Trust*

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1. Introduction

Flood disaster is one of the world's most reoccurring and devastating catastrophes. The impacts of flood disasters on society and their effect on sustainable development have been overwhelming in recent years. Therefore, this phenomenon has been linked to climate change as a new disaster risk driver, increasing hazards and vulnerabilities among business owners (Komolafe, Adegboyega, & Akinluyi, 2015). Previous research shows that scholars have studied and explored various aspects of disaster management and its impact, including the effect of implementing disaster preparedness activities (Hashim, Ng, Talib, & Tamrin, 2021). The advancement of meteorology and hydrology in academic fields has enhanced flood predictions and warning systems (Alfieri et al., 2017). According to Agusomu (2013), flood preparedness is a warning system designed to inform people, communities, and business owners about the potential for flooding in a specific area, therefore allowing them to take preventive measures and mitigate disaster posed by flooding potentials. Flood is a special kind of natural hazard that accounts for about one-third of all natural disasters in both developed and developing countries (UNISDR, 2012). One of the most prevalent and widely dispersed natural threats to life and property worldwide is flooding, and business owners' perceptions about these natural disasters play a critical role in determining their preparedness and response methods. When there is a significant risk of flooding, authorities, metrologies, or other responsible parties will issue a flood warning to the general public or particular locations (Kankanamge, Yigitcanlar, Goonetilleke, & Kamruzzaman, 2020). The purpose of this warning is to create awareness among business owners and the general public about the potential danger and encourage them to take the appropriate safety measures to protect their lives and property. However, how individuals and business owners perceive flooding is a crucial social factor in flood

management that affects how people react to flood warnings and initiatives to improve community preparedness.

The devastating effects of this disaster are recorded in terms of mortality and economic risk by both national and international agencies. Although research claims that the mortality rate is reducing globally due to the established early warning systems in some countries (mostly the developed), in some localities, especially in developing countries, those living in the flood-prone areas, still witness increasing death tolls and economic losses because of their level of exposures and vulnerability (Komolafe et al., 2015). These impacts of disasters can be reduced through preparedness activities undertaken by organizations. Disaster preparedness comprises of activities designed to enhance the ability of businesses to undergo emergency actions to protect properties, contain disaster damage, and promote engagement in post-disaster restoration and early recovery (J. Sutton and K. Tierney, 2006).

The level of preparedness can be determined by business owners' participation in preparedness activities. These activities are composed of tangible and measurable actions that must be carried out to meet the preparedness objectives.

In comparison to emergency warnings, flood alerts are distinguished by a longer lead time (i.e., the interval between the time the warning is issued and the projected impact) and/or a smaller predicted impact. The latter are utilized for forecasts of floods with shorter lead times and greater severity (Golding, 2009). In order to create efficient disaster management plans and increase resilience in the face of such catastrophes, it is crucial to comprehend how business owners perceive flood alerts. This will increase the likelihood that recipients will take the recommended protective measures (Keller, 2012; van Buuren, Lawrence, Potter, & Warner, 2018). Flood alerts for business owners should include all the necessary information to prompt recipients to respond appropriately ((Khalid & Shafiai, 2015; Kuhlicke et al., 2020; Rollason, Bracken, Hardy, & Large, 2018). In addition to the characteristics of flood alerts, business owner reaction to a flood alert is influenced by personal characteristics (e.g., age, familiarity with hazards, and trust in authorities) and situational factors, such as the experience of business owners in flood-prone areas. (Ahmad & Afzal, 2020).

According to Savadori et al. (2013), the concept of flood risk perception relates to the intuitive risk assessments made by business owners and social groupings in sparse and ambiguous data. These evaluations change between people or business owners because of varying levels of knowledge, uncertainty, differences in intuitive behavior, and particular power configurations and positions of interest. Business owners' perceptions of flooding are sometimes ignored when creating flood control plans. How individuals and businesses perceive flooding is a crucial social factor in flood management that affects how people react to flood warnings and initiatives to improve community preparedness. When policymakers ignore the subjective and highly contextualized nature of public opinion, this will hurt the strategies implemented by disaster management (Brown & Damery, 2002; Morgan & Keith, 1995). The study area focused on Lagos Island due to its proneness to flood. More so, there are residential and very high commercial business activities in this area which are affected by flooding yearly. A study by Olayinka and Irivbogbe (2017) shows that Lagos Island is more vulnerable to flooding, which negatively impacts business activities. However, previous studies have understudied how trust in communication influences business owners' flood preparedness. This includes how governments communicate and analyze strategic information that addresses doubts or miscommunication, which strengthens the reliability of the information related to floods among business owners in Lagos Island, Nigeria. Hence, the objective of this study is to identify and analyze (Risk perception, resource availability, previous experience, and access to information) as factors influencing flood preparedness among business owners.

The following research questions aim to address: What level of preparedness would you have to respond to a flood alert? What factors influence preparedness, and how does this perception vary among business owners? How do trust in information sources affect the level of preparedness? Is there any relationship between trust and Preparedness?

The contribution to this study will enable business owners to reduce these risks by using timely flood alerts to establish effective preparedness and response measures to avoid further economic loss. This study contributes significantly to how business owners help create a robust business continuity through effective preparedness strategies to address some primary areas of concern during and after flood events. This study provides disaster risk management with an insight into the consideration of non-technical approaches and provides them with the opportunity to broaden social science-derived variables in disaster risk management. This study further provides insight into the level of trust in communicating flood alerts between the policymaker and the business owners to improve this level of trust.

2. Materials and methods

2.1. Study area

The study area is Lagos Island Eti-osa Local Government Lagos State, Nigeria. Lagos Island is an adjoining local government area that shares boundaries on the north with the largest coastal lagoon in Western Africa, Lagos. It is a densely populated area with a land area of approximately 4.996 square kilometers. It is located within Latitude 6°26' 34" N and Longitude 3°24' 30" E on the left and Latitude 6°27' 8" N and Longitude 3°22' 42" E on the right. The study area can be described as a place with various land uses which comprises of commercial areas with residential and institutional land uses. Figure 1 shows the location of the study area.

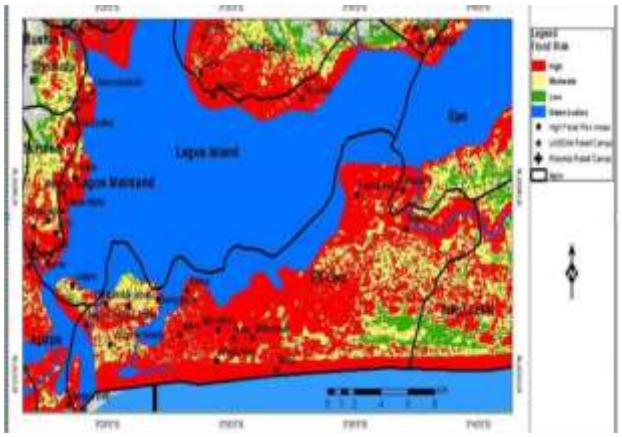

Figure 1: Geo-spatial mapping of Lagos Island. Source: Lagos State Ministry of Environment.

2.2. Targeted participants

This study collected data on business owners' perceptions of flood awareness in Lagos Island, Nigeria. The respondents were carefully chosen from a social media forum by primarily selecting business owners who actively discuss flood challenges and their businesses in this area. A list of business owner's contacts were compiled to achieve a specified target. Therefore, a structured questionnaire was designed as a primary source of data collection among business owners to assess their perception of flood awareness.

2.3. Samples size and data collection

A total of 325 questionnaires were designed to collect data from active business owners in Lagos Island, Nigeria, via Question Pro online survey (Bhardwaj, 2019). The sample size of 325 was chosen to ensure the reliability and validity of our study. This sample size offers a good margin of error ranging within ±5% at a confidence level of 95%, which is suitable for generalizing large data collection. This study generated a URL link questionnaire, shared it among voluntary business owners who agreed to participate on social network platforms, and distributed it using a random sampling method to WhatsApp and Facebook platforms to reflect their perception of flood awareness. Random sampling was carried out using a random number initiator to select users who are business owners from this forum. After a successful collection of data, all responses were downloaded into an Excel spreadsheet to carry out the analysis. This study adopted the use of Statistical Package for Social Sciences (SPSS v20) software using descriptive statistics and a chi-square test to analyze the data collected, and this will enable the study to achieve its originality and reliable information from the focus group and to achieve our aims and objectives of the study (Zhang, Huo, Zhou, & Xie, 2010).

2.4. Data analysis and interpretation

Considering the nature of this study, the size of the business population in Lagos Island as well as the limited timeframe and resources available for this research, simple random sampling methods were used to administer the questionnaires to the business owners about their perception of flood alerts in Lagos Island Nigeria (Bhardwaj, 2019).

4.1 Statistical Analysis

This study used tables to characterize the statistical analysis and also cross-tabulate trust in flood alert messages and preparedness among the business owners to test the significant relationship between the two variables using Chi-square:

$$\chi c2=\sum (Oi-Ei)2 / Ei$$

Where:

c =Degrees of freedom

O = Observed value(s)

E=Expected value(s)

3. Results and discussion

3.1. Socio-demographic characteristics of respondents

The demographic data shows that 206 of the sampled respondents are male, while 119 are female, as shown in Table 1. This difference in gender proportion showed men predominantly owned businesses in this area, which could be as a result of high place attachment, religion, and ethnic domination, or it could be as a result that men are significant risk takers.

Table 1: Gender of the respondent

Variable	Frequency	Percentage
Male	206	63.4%
Female	119	36.6%
Total	325	100

Source: Question Pro online survey 2023.

Table 2 depicts the occupational status of the respondent. 30.2% of the respondents are engaged in Trading/business, 19% are engaged in farming, 33% are engaged in fishing, 9.8 are Artisans/craftsmen, and 8% are Civil servants. Therefore, based on the observation during data collection, most of the participants are engaged in two (2) occupations. This finding confirms with Oruonye, E.D. (2012) which affirms that vast majority of the residents in eti-osa, Lagos Island engaged in fishing and trading/business.

Table 2: Occupation of the respondents

Variable	Frequency	Percentage
Trading/business	98	30.2
Farming	63	19
Fishing	107	33
Artisan/craftsman	32	9.8
Civil Servant	25	8
Total	325	100

Source: Question Pro online survey 2023

How long have you lived in Lagos Island?

Table 3. Interpretation, 56.5% of the business owners has been residing there for 18 years and above, 17.4% for 4 - 7 years, and 13.1% for 0 – 3. Our findings indicated that business owners' years of residing in this particular area have a significant impact on their level of preparedness. This finding supports the assumption that business owners who lived in the Lagos Island floodplain have a reasonable understanding of the flooding problem in Lagos Island since they have lived there for some time. This study is in accordance with (FASINA, SALISU, & AKANMU, 2020) who reported significant influence of longitivity of residences on flood and disaster management.

Table 3: How long have you lived in Lagos Island?

Years of living in (Lagos Island)	Percentage (%)
0 – 3	13.1
4 – 7	17.4
8 – 11	8.7
12 – 17	4.3
18 years and above	56.5
Total	100

Source: Question Pro online survey 2023

How old is your business?

Table 4. 63% show their business is within the range of 16 years and above, 21.7% are 4 -7 years, while other business owners with lower years of duration have less than 16% altogether. This could be as a result of the nature of their occupation or business that thrives exceeding in this environment, such as fishing. With this factor, the business owner could still choose to live in this environment due to the economic and business opportunities. However, the negative consequence of flood-prone areas will hurt their business, except for those who are familiar with flood alert systems.

Table 4: How old is your business?

Years of business	Percentage (%)
0 – 3	6.5
4 – 7	21.7
8 – 11	6.5
12 – 15	2.3
16 years and above	63
Total	100

Source: Question Pro online survey 2023

What do you think are the main causes of flooding?

Table 5: illustrated that rainfall constitutes 45.3%, proximity to drainage system 30.7%, land use and low land area constitute 10% and 14%, respectively are perceived main cause flooding in Lagos Island. This study findings is related to (Ologunorisa, Eludoyin, & Lateef, 2022). According to Etuonovbe (2011), most flood events in the tropics that are partially or entirely climatological in nature are thought to be primarily caused by rainfall intensity, duration, and amount.

Table 5: What do you think are the main causes of flooding that could impact your business?

Causes of flooding	Percentage (%)
Proximity to the drainage system	30.7
Land Use	14
Low land area	10
Rainfall	45.3
Others	0
Total	100

Source: Question Pro online survey 2023

As a business owner, how well-informed are you on flood alerts?

Table 6 shows that 41.4% of the business owners in Lagos Island are not informed of flooding alerts. In comparison, 28.6% are slightly informed, which means business owners often do not receive timely and relevant information or updates regarding the possibility or occurrence of a flood in their area. Adequate information is crucial as it will reduce the business owners' chances of experiencing economic loss; it also enables them to proactively assist the local authorities and offer resources in their own way to the residents during flooding (Oyatayo, Songu, Adi, Jidauna, & Ndabula, 2016). The analysis shows that the majority of the respondents (two-thirds, or 70%) are not informed to some extent about flood alerts; therefore, providing a non-technical approach such as translation due to high concentrations of cultural diversity in this area will enable the business owners to be well-informed.

Table 6: As a business owner, how well-informed are you on flood alerts?

How well-informed	Percentage (%)
Not Informed	41.4
Slightly Informed	28.6
Informed	14.8
Well Informed	17.2
I don't know	0
Total	100

Source: Question Pro online survey 2023

As a business owner, what level of preparedness would you have to respond to a flood alert?

Table 7 indicates that 45% of business owners are highly prepared for flooding, while 28.2% are averagely prepared. This analysis supports and conforms to the study of Ahile and Adityavyar (2014). With this high level of preparedness, business owners show precautions to protect their employees, customers, and assets for the purposes of business continuity in Lagos Island.

Table 7: As a business owner, what level of preparedness would you have to respond to a flood alert?

Level of Preparedness	Percentage (%)
High Level	45.7
Slightly High	8.7
Medium Level	28.2
Slightly Low	2.2
Low Level	4.3
I don't know	10.9
Total	100

Source: Question Pro online survey 2023

What level of trust do you have as a business owner about flood alerts?

Table 8 indicates that 32.6% of business owners are above average, while 37% are averagely aware of flooding with the level of trust in flood alerts. Also, 4.3% of business owners have very low trust in flood alerts. About 10.9% don't know where they stand in their level of trust in flood alerts. The low or average level of trust in flood alerts emanates from several factors, which include inadequacies in previous alerts, previous experience due to inaccuracies, and lack of transparency, which impact their trust level. Previous studies show that the role of trust in communicating disaster (i.e., flood) heavily depends on previous information validity and reliability (Bösmeier, Himmelsbach, & Seeger, 2022). The doubts Individuals residing in this area have about trust could result from a lack of local knowledge or a failure to communicate risk in clear terms (Mileti & Sorensen, 1990). It is also noted, the void engagement between the policymaker and communities involved before the disaster can bring about distrust (Kuhlicke et al., 2020). This means the study conformed with and supported Oruonye (2012), who studied the business owner's trust preparedness considering the future risk of having a business in a floodplain area.

Table 8: What level of trust do you have as a business owner about flood alerts and warnings?

Level of Trust	Percentage (%)
Very High	13
Above Average	32.6
Average	37
Below Average	4.3
Very Low	2.2
I don't know	10.9
Total	100

Source: Question Pro online survey 2023

Result of Statistical Analysis relationship between trust and preparedness

Ho: There is no significant relationship between trust and preparedness since the P-value is 1.3628 at a 0.05 significance level using Chi-square =136.349. Therefore, we reject the null hypothesis, which states that there is no significant relationship between trust in flood alerts and the preparedness of business owners in Lagos Island. This means that the level of trust in flood alerts did not influence the business owners' preparedness in that area.

H1: There is a significant relationship between trust in flood alerts and the level of business owner preparedness in Lagos Island. Since the p-value 1.3628 is greater than $\alpha = 0.05$, we accept the alternative hypothesis that trust, and level of preparedness have a significant relationship when business owners receive flood alerts in Lagos Island.

Table 9: Cross-tabulating the significance between trust and preparedness

What level of trust do you have as a business owner about flood alerts?	As a business owner, what level of preparedness would you have to respond to a flood alert?						Total %
	High level	Slightly high	Medium level	Slightly low	Low level	I don't know	
Very High	10	2	0	0	0	0	12
Above Average	23	6	4	0	0	0	33
Average	12	0	21	0	2	2	39
Below Average	0	0	4	0	0	0	4
Very Low	0	0	0	0	2	0	2
I don't know	0	0	0	2	0	8	10
Total %	45	8	29	2	4	12	100

4. Conclusion

Business owners in Lagos Island prioritize preparedness strategies that ensure their personal and business survival. The findings highlight that those who have lived in this area for a long time are more familiar with the flood risks, giving them an advantage in anticipating and responding to such disasters. This approach ensures that respondents have a realistic understanding of flood alerts and how they can prepare to minimize their impact.

Over the years, media coverage of severe flooding and increased government responses at federal, state, and local levels have heightened public awareness of flood risks. As a result, business owners are more conscious of external threats and are more likely to take proactive measures than in the past. When flood alerts are issued, experienced business owners often choose to temporarily close their businesses to prevent financial losses—allowing them to focus on preparedness strategies that safeguard their livelihoods.

Timely and accurate flood alerts play a critical role in helping businesses mitigate the damaging effects of flooding. While much emphasis are placed on the accuracy and reliability of hydrological forecasts, the way these flood alerts are communicated is crucial too. Even the most precise forecast is useless if it does not reach business owners in a clear, timely, and understandable manner. The effectiveness of a flood alert depends on its ability to prompt the right actions from its recipients. That means the format, content, and delivery channels must be designed to ensure business owners can easily interpret and act on the information without confusion.

Flood alerts should also be made to specific local contexts not one-size-fits-all approach. A customized strategy that considers the unique flood risk perception, local conditions, and communication needs of business owners are essential. The findings of this study reinforce the importance of integrating flood alerts with broader communication efforts, ensuring that they are relevant and actionable and effectively support business owners in making informed decisions. Moving forward, further research is needed to enhance flood warning systems, considering factors such as local risk perception, the effectiveness of warnings, and overall communication quality.

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