Flood Risk Perception and Government's Role in Implementing Regulations

ABSTRACT

A study in Freetown, Sierra Leone, investigates how public perceptions of flood risk correlate with participation, government action satisfaction, prevention knowledge, and institutional trust. Findings show that public involvement and trust can reduce perceived flood risks and that greater risk perception negatively influences views on government efforts. Through structural equation modeling, the research also finds that knowledge and trust shape the impact of public engagement on satisfaction with government actions. Demographic variables, such as gender, age, income, and education, impact these relationships. The study emphasizes the need for clear communication and participatory strategies to build trust and satisfaction in government flood risk management. With a high determination coefficient (0.728), the results are vital for policymakers, highlighting the need for strategies that tackle both perceptions and the actualities of flood risks.

Keywords: Flood risk perception; Public participation; Flood knowledge; Institutional trust; Government regulations.

1. INTRODUCTION

Flood risk perception, a vital component in flood risk management research, embodies the understanding and apprehending potential flood hazards. It is observed that a heightened sense of risk perception correlates with a greater intent to participate in flood prevention measures [1]. This correlation suggests that when individuals acknowledge the seriousness and threat of flood risks, they are more inclined to undertake measures to mitigate these risks. Such preventive actions might encompass employing flood-resistant building techniques, engaging in early warning systems, and actively participating in community-level flood prevention strategies. Therefore, the paper will examine the six disaster-prone communities in Freetown, Sierra Leone.

Understanding flood risk perception requires exploring how individuals and communities interpret the likelihood and severity of flood events. This perception is shaped by cognitive biases, emotions, and social dynamics [2]. Personal experience with floods and the resulting loss can profoundly influence perception and prompt behavioral changes for future risk reduction [3]. Effective flood management relies on government regulations that oversee land use, urban planning, and community resilience strategies. Few (2003) highlights the importance of regulatory frameworks that enforce sustainable development practices, reduce vulnerability, and enhance adaptation to flood risks [4].

Public engagement in flood risk management involves collaborative efforts between stakeholders, authorities, and at-risk populations. It is critical to ensure that risk reduction strategies are well-informed and community-specific [5]. Moreover, inclusive public engagement can reinforce trust and cooperation in government-led initiatives [6]. The assessment evaluates the effectiveness of measures to prevent or mitigate flood impacts. This assessment is influenced by public engagement, which provides a platform for incorporating diverse perspectives and local knowledge into flood risk management [7].

Flood knowledge encompasses understanding the causes, impacts, and mitigation strategies related to flooding. It is essential for informed decision-making and risk communication [8-9].

Accumulated knowledge about floods and prevention strategies can lead to better preparedness and adaptive behaviors [10]. Trust in institutions is pivotal in how communities respond to and comply with flood risk regulations and advisories. The level of trust affects the perception of the efficacy of government actions and can either facilitate or hinder public cooperation in risk management [11-13].
Therefore, the paper will contribute to a deeper understanding of the dynamics between flood risk perception and government regulation, highlighting the need for informed policymaking and community engagement in flood risk management.

2. THEORETICAL LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1. Flood Risk Perception and Assessment of Government Flood Risk Regulation Implementation

In recent years, interdisciplinary study in sociology, psychology, public administration, and communication has turned risk perception into a hot and cutting-edge topic. As described by some academics [14-16], flood risk perception is the subjective assessment and physical experience of a flood occurring. Studies have shown that attitudes and behaviors are greatly influenced by how one perceives the risk of flooding. The outcome of the Government's implementation of its flood risk strategy will, therefore, be impacted by how much people perceive the risk of flooding and how much risk-taking behavior they engage in [17]. The local Government in Sierra Leone is the primary institution for environmental governance and oversees the country's protection from the risk of flood disasters, specifically by enforcing the criteria set forth by the Central Government for flood prevention. The country's total environmental regulation effect is directly impacted by its flood prevention regulation implementation conduct. Suppose the local Government consistently disregards the public's impression of high flood risk. In that case, it will immediately result in a continual decline in environmental quality and environmental events because of the failure to enforce flood risk regulations [18-19]. Concerning public perception of flood disaster risk from a practical perspective, Sierra Leone is at a high-quality stage where it is urgent to achieve practical environmental governance. It is also a realistic topic that the local Government must face while implementing flood risk prevention regulations [20]. As a result, the following preliminary hypothesis is suggested considering the analysis shown above:

H1: The higher the degree of flood risk perception, the higher the evaluation standard of government flood risk prevention regulation implementation.

2.2. Engagement of the Public and Implementation of Government Flood Risk Prevention Regulation

Scholars in Sierra Leone and abroad have made it clear through theoretical research and empirical tests that public participation plays an essential and positive role in local government flood risk prevention regulation implementation behavior [21]. Public participation will affect the effect of policy implementation. Public participation will reduce the government flood risk prevention regulation implementation cost due to a higher public reporting rate. The local Government provides more services to meet public flood risk prevention requirements by strengthening flood risk prevention regulation. With the continuous strengthening of the knowledge of flood risk protection and awareness of the rights of protecting the environment against flood disaster risk, the public expresses their environmental demands to the local Government through letters and visits, telephone calls, online reports, etc. Effective supervision and restriction on implementing local government flood risk protection regulations can "force" the provincial Government to intensify the enforcement of flood risk prevention policies and avoid the differences in implementing flood risk prevention policies due to regional interests [22]. Therefore, based on the review above, - the second hypothesis is proposed as follows:

H2: The higher the degree of public participation, the higher the evaluation of government flood risk prevention regulation implementation.

2.3. Perception of Flood Risk and its Relationship with Government Flood Risk Prevention Regulation

Researchers [23] measured and calculated the index of people's livelihood and discovered that "perception of flood risk prevention is an important element of the people's livelihood, which has a big impact on the subjective indicators of people's livelihood." A key objective of administrative reform is to create a service-oriented government that is popular with the populace. Public perception of service quality will impact public happiness with services since flood risk prevention and environmental service performance are two key variables to measure public satisfaction [24]. Public satisfaction will be impacted by public perception. The public will evaluate the implementation of local government flood risk prevention regulations based on changes in various flood risk disasters. The public's perception of the risk of flooding may not always match the occurrence of flood disasters. The appraisal of local governments will also be skewed if the public's perception of the risk of flooding is incorrect. By focusing on and directing the public's psychological expectations for future flood risk prevention regulation, the local Government can maximize the performance of flood risk prevention regulation implementation behavior. Based on risk perception, the public will have expectations for the future of flood risk prevention regulation. Considering the analysis presented above, the following third possibility is suggested:

H3: The higher the degree of flood risk perception, the lower the satisfaction of government flood risk prevention regulation.

2.4 Involvement of the Public and Their Evaluation of Government Flood Risk Prevention Regulation Implementation

Achieving satisfaction is a collaborative activity between the government and public in mitigating flood risk in disaster-prone communities. Some researchers held the opinion that public participation would influence how they perceived the performance of public services, that the Government's positive responses to citizen demands would increase public trust, and that this would then influence how satisfied they were with public services [25]. The public pays close attention to flood disaster incidents through various avenues, including complaints, petitions, and public opinion. At the same time, the local Government will raise expenditures to improve the implementation outcome and increase the efficiency of flood risk prevention regulation implementation. According to the expectation model, public satisfaction is the difference between actual and expected performance. Participation by the public has grown to be a powerful tool for expressing needs and expectations. It is simpler to obtain greater satisfaction with higher public participation. Public satisfaction will significantly increase if expectations are realized [23]. Ensuring that public participation is effective would aid in finding speedy solutions to flood risk issues that the Government and market have not yet identified. This satisfies the public's expectations and raises their satisfaction with flood risk reduction regulations. Considering the discussion above, the following fourth possibility is suggested:

H4: The higher the degree of public participation, the higher the satisfaction with government flood risk prevention regulation implementation.

2.5. Assessment of Government Flood Risk Prevention Regulation Implementation and Satisfaction with Flood Risk Prevention Measures

In flood risk prevention regulation, the public must support the implementation process and effect of government flood risk prevention regulation. The more the public is satisfied with flood risk prevention regulation, the smoother the government implementation of flood risk prevention regulation, and the better the effect. The empirical results show that improving the

government's ability to implement flood risk prevention regulations is a meaningful way to relieve public flood risk complaint petitions. President Dr. Julius Maada Bio repeatedly emphasized the “sense of gaining,” which can be interpreted as public satisfaction. Satisfaction reflects current happy experiences and future expectations of the public. Therefore, public satisfaction and guiding public expectations are essential for the Government. However, the implementation of government flood risk prevention regulation is more of an extension and supplement of the pool of environmental policy. Their efforts in responding to public satisfaction are insufficient. The effect of implementing flood risk prevention regulation is not significant, leading to moderate public satisfaction. To solve these problems, the Government should take practical flood risk prevention regulation enforcement actions to reduce enforcement costs and enhance political power. Combined with all the reviews and discussion above, the fifth hypothesis is proposed as follows:

H5: The higher the satisfaction with flood risk prevention regulation, the higher the evaluation of government flood risk prevention regulation implementation.

2.6 Satisfaction with Flood Risk Prevention Regulation as a Mediating Variable

Public service satisfaction and government public service quality are highly correlated, and the latter might directly reflect the former [26-28]. According to [29], contentment with government public services substantially impacts public well-being in developing countries. As a result, contentment with the Government's implementation of flood risk prevention regulations can be considered a mediator variable. According to [30-31], in 2018, government flood control conduct was positively impacted by the general public's unhappiness with implementing flood risk prevention regulations. Some claim that customer satisfaction is influenced by service quality perception in the studies of the relationship between service satisfaction and service quality perception. Some believe that the public assessment of the Government's performance in implementing flood risk prevention regulations is inconsistent [26-28]. The lack of attention paid to public perception is the cause of the inconsistency. Based on this, the following hypothesis is put forth:

H6: flood risk prevention regulation satisfaction plays an intermediary role in the relationship between flood risk perception, public participation, and the evaluation of government flood risk prevention regulation implementation.

H6a: Flood risk prevention regulation satisfaction plays an intermediary role in the relationship between flood risk perception and government flood risk prevention regulation implementation evaluation.

H6b: Satisfaction in Flood risk prevention regulation plays an intermediary role in the relationship between public participation and government flood risk prevention regulation implementation evaluation.

2.7. Knowledge of Flood Risk Prevention Regulation as Moderator Variable

The term "flood risk knowledge" refers to the indications and ideas associated with flood risk prevention laws that the general population knows, who can recognize issues and their effects and then act accordingly to reduce flood risk [32-33]. According to multiple research projects, the degree of one's understanding of flood risk and one's impression of the likelihood of experiencing a flood disaster are significantly correlated. However, since public perception of a particular risk does not solely depend on public attitude, there is no association between public perception of flood risk and public awareness of flood risk. Knowledge of the risk of a flood disaster significantly impacts public behavior regarding flood risk prevention regulations. The public will have a more favorable attitude toward flood risk. It will behave responsibly when contributing to implementing flood risk prevention regulations the more comprehensive their knowledge of flood catastrophe risk is. The public's attention to flood risk disasters and efforts to prevent them rises as they gain more understanding about flood disaster risk

protection, and as a result, so do their expectations and demands of the Government's response to and resolution of flood disaster risk issues. Based on the analysis and debate above, the following hypothesis is put forth:

H7: The higher the public's familiarity with flood risk knowledge, the stronger the flood risk perception. The more public participation behaviors, the higher the evaluation standard of government flood risk prevention regulation implementation behavior.

2.8. Institutional Trust as Moderator Variable

In the context of "Flood Risk Perception and Government's Role in Implementing Regulations," institutional trust is a critical moderating variable that shapes individuals' actions. This discourse pivots on the trust vested in governmental capacity, which has been linked to a propensity for adopting proactive mitigation behaviors. Lin et al. (2008) suggest that this trust correlates with an individual's willingness to take positive actions to combat risks like earthquakes and hurricanes [34].

Empirical evidence, however, presents a dichotomy. Within the United States, studies like those of [35-36] demonstrate a positive correlation between trust in governmental disaster management and a heightened sense of preparedness for natural disasters. Conversely, European studies highlight a potential adverse effect where a firm trust in governmental capacity might lead to complacency, with individuals feeling less compelled to prepare for disasters independently, anticipating that the government will adeptly manage any crisis [3,37].

Institutional trust encapsulates the public's perception of the government's equitable law enforcement, reflecting whether government actions and decisions align with public expectations and interests. This trust becomes particularly salient in the government's role in enforcing flood risk prevention regulations. The extent to which the public perceives the risk of flooding is intimately tied to their trust in the government's ability to mitigate such disasters effectively. A rising public perception of flood risk may signal a burgeoning crisis in trust in the government system.

Wang (2018) underscores that factors such as perceived flood risk magnitude, community engagement willingness, robust institutional frameworks, and adequate government trust levels are instrumental in fostering public participation [3, 39]. In this vein, institutional trust acts as a moderating variable, influencing the perceived efficacy of government regulations on flood risk management. This trust can either spur or hinder public involvement in disaster mitigation, thus playing a pivotal role in shaping the landscape of flood risk perception and management. The eighth theory is suggested as follows, considering the analysis presented above:

H8: The higher the degree of institutional trust, the stronger the public participation willingness, the lower the flood risk perception, and the higher the evaluation of government flood risk prevention regulation implementation behavior.

2.9 Proposed Conceptual Model

The model begins with flood risk perception, representing the public's understanding and awareness of flood risks. This perception is influenced by multiple factors, including personal experiences with flooding, availability of risk-related information, and sociocultural influences, as [2] discussed. Government regulation and implementation of flood risk highlights the influence of public perception on how the Government implements flood risk management regulations. This suggests a two-way relationship where public perception shapes regulatory approaches, and these approaches, in turn, affect public perception, emphasizing the critical role of government policy in flood risk management [4]. Public engagement demonstrates that effective regulation often involves or requires the participation of the community. Engagement strategies must ensure that information is disseminated effectively, and that public feedback

is incorporated into policymaking, highlighting the importance of effective communication and stakeholder involvement [5].

Subsequently, the model addresses the assessment of flood risk prevention, which is influenced by the level of public engagement. This step evaluates the effectiveness of preventive measures and strategies deployed to mitigate flood impacts, informed by the knowledge and input from the engaged public. Flood knowledge is a critical element, signifying the collective knowledge and understanding of floods and flood prevention that the public, Government, and institutions have accumulated. It is the foundation upon which risk perception and the effectiveness of engagement strategies are built, as per [8]. Lastly, institutional trust indicates that trust in institutions can significantly influence how the public perceives flood risks. Trust determines the effectiveness of communication and the adherence to regulations and advisories issued by the authorities [6,11,12].

2.9.1 Interconnectedness in the Model

The conceptual model operates on a feedback loop system. Public engagement and institutional trust feed back into flood risk perception, indicating a dynamic and iterative process. The model reflects that as the public becomes more knowledgeable and trust in institutions strengthens, their perception of flood risks evolves. This evolution potentially leads to more robust public engagement, more informed assessments of flood risk prevention, and more effective implementation of government regulations.

2.9.2 Application of the Model

This model can be applied to design and evaluate flood risk management strategies. By acknowledging the interdependent nature of these elements, policymakers and disaster management practitioners can develop more targeted, inclusive, and adaptive approaches to flood risk management. The model is a conceptual framework for investigating how different interventions or changes in one element can influence the flood risk management system.

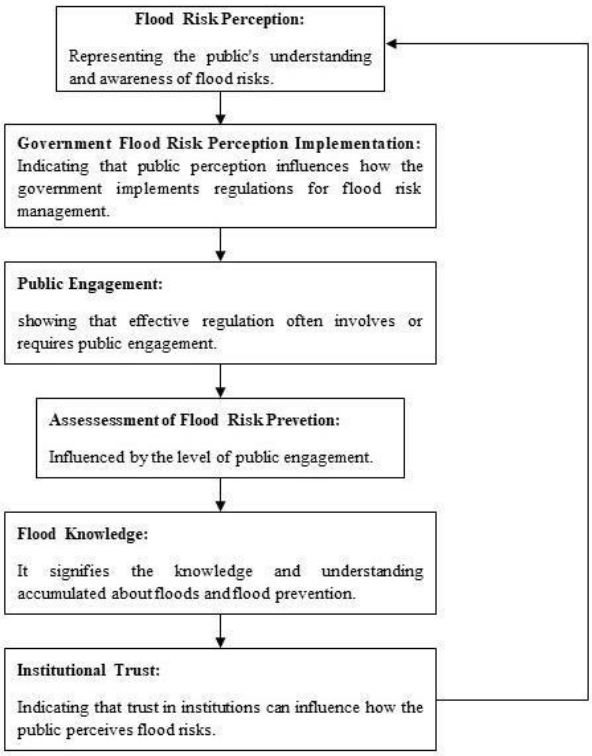

Figure 1 Proposed research model

Therefore, the conceptual model captures the complex interplay between individual perceptions, collective knowledge, government action, and institutional trust in the context of flood risk management. It underlines the importance of a multi-faceted approach considering psychological, social, and governance dimensions to manage and mitigate flood risks effectively.

3. MARTERIAL AND METHOD

3.1 Design and Data Source

This data offers a sizable sample with a broad distribution, which is appropriate for this thesis area. Table 1 compares the chosen measurement items to relevant factors. Data were cleaned during the analytic process to match the paper's requirements, invalid and missing values were deleted from the STATSL2020 questionnaire, and 1,500 valid observations were ultimately used. The controllable variables added in this chapter include the survey location, gender, age, income, and educational attainment. In the STATSL2020 survey, respondents were asked to indicate how seriously they perceived the risk of flooding: "very seriously=1", "serious=2", "lessseriously=3", "not seriously=4", and "normal=5". The answer is scored inversely for consistency of analysis, meaning that the perception of the effectiveness of applying the flood risk prevention legislation is more robust the higher the score.

With the gradual strengthening of the flood disaster risk protection complaint system, the methods of protecting rights regarding public participation are also becoming more varied. Questions about letters and visits are created in the ***F*** "module." Each question receives a score that can range from 1 to 5. The more points received, the more actively the public participated. This section assesses the Government's implementation of flood disaster risk prevention regulations using the enforcement of flood risk prevention regulations and the legalization level of flood disaster risk prevention regulations. The "legal module" F contains the samples. The original questions are distributed in F9, F10, F11, F13, and F25. This variable is likewise reflected in section B's question B15. Based on this, scores are evaluated from 1 to 5, and the higher the score, the more strictly government regulations regarding flood risk reduction and legality are enforced.

The satisfaction with governmental *flood disaster risk prevention regulation* is covered in question B15. The corresponding evaluations in the original survey are "extremely satisfied=1," "satisfied=2," "less satisfied=3," "dissatisfied=4", and "very dissatisfied=5". The answer is given inverted for the sake of analytical consistency. The satisfaction increases as the score rises. Respondents are asked to rate each question on a scale of 1 to 5 to express their level of satisfaction with the public services provided by governments in B16 and B17. The satisfaction increases as the score rises.

The knowledge of *flood risk prevention regulation* is described in question B25. The ten items range in difficulty from 1 to 10. The greater the score, the more knowledgeable the respondents were about the *flood risk prevention regulation*. The general trust assessment in the core module of section A, where the items were dispersed in A33 and A35, reflects institutional trust. Each question requires responses using a score ranging from 1 to 5—the more points, the greater the level of confidence. Meanwhile, in this thesis, we also control for a series of demographic variables about the respondents, such as survey location, educational status, income, gender, age, and others.

3.2. Variables and Measurement

3.2.1. Variables and Measurement

A brief description of the measurement items and examples of measurements are provided in Table 1.

Table 1 Variable description and measurement

Variable	Description of measurement items	Measurement illustration	Cronbach's α coefficients
Flood disaster risk perception	Perception of flash flood happenings in Freetown Municipality	Use a score ranging from 1 to 5, assigned inversely; the higher the score, the stronger the public flood disaster risk perception	0.902
Public participation	Letters and visits will not be hindered; Letters and visits can solve problems; Understand the litigation process; Apply to attend the trial; After the judgment result, consult the judgment.	Use a score ranging from 1 to 5; the higher the score, the higher the degree of public participation.	0.872
Satisfaction of *flood disaster risk prevention regulation implementation*	Are you Satisfied with public services provided by governments? Are you Satisfied with government *flood disaster risk prevention regulation*?	Use a score ranging from 1 to 5; the higher the score, the higher the public satisfaction with government *flood disaster risk prevention regulation*. Use a score ranging from 1 to 5, assigned inversely, the higher the score, the higher the public satisfaction with government *flood disaster risk prevention regulation*.	0.913
Knowledge of *flood disaster risk prevention regulation*	The drainages constructed do not threaten flood disaster; Excessive use of plastics and improper disposal lead to flood disaster damage; living in flood disaster-prone communities does not cause flooding.	Use a score ranging from 1 to 10. Add 1 point if it is correct. The higher the score, the higher the public *flood disaster risk prevention regulation* knowledge level.	0.893
Institutional trust	Do you think most people in society can be trusted? It is considered unfair to the community. Does the public have sufficient right to know about flood disaster prevention information?	Use a score ranging from 1 to 5. The higher the score, the higher the public trust in flood disaster prevention regulation.	0.874
Evaluation of government flood disaster prevention regulation	Are you satisfied with the Government's performance in handling affairs impartially? How efficiently is the Government dealing with flood disaster incidents that seriously	Use a score ranging from 1 to 5; the higher the score, the stronger the enforcement of government flood disaster prevention	0.921

implementation behavior	damage residents. What is the degree of legalization of the government in dealing with flood disaster incidents? Will government leaders be held accountable for unilaterally pursuing GDP and neglecting supervision of causes of flooding, resulting in flood disasters?	regulation and the higher the level of legalization.	
Place of investigation	Western Rural =0, Western Urban =1		
Educational level	Primary school and below, Junior Secondary School, Senior Secondary School, College and above	The higher the score, the higher the educational degree and the longer the academic period.	
Personal income	USD 0–316, USD 317–791, USD 792–1266, >USD 1266		
Gender	Male =0, Female =1		
Age	<18, 18–44, 45–60, >60		
Evaluation of government flood disaster prevention regulation implementation behavior	Are you satisfied with the Government's performance in handling affairs impartially? How efficiently is the Government dealing with flood disaster incidents that seriously damage residents. What is the legalization degree of Government in dealing with flood disaster incidents? Will government leaders be held accountable for unilaterally pursuing GDP and neglecting supervision of causes of flooding, resulting in flood disasters?	Use a score ranging from 1 to 5; the higher the score, the stronger the enforcement of government flood disaster prevention regulation and the higher the level of legalization.	0.921

Source: Authors' review

4. 3 Empirical Results

4.3.1 Results

The reliability of the tested selection is examined using reliability analysis. According to the findings, all Cronbach's coefficients are higher than 0.850 (Table 1), which satisfies the reliability standards. As a result, these inquiries can be used for additional research. Further, Exploratory Factor Analysis (EFA) reveals that all variables have KMO values greater than 0.8 and a p-value for Bartlett's Sphericity test close to zero, pointing to the scale's structural solid validity. Most of the variables are substantially correlated, as shown in Table 2, and this preliminary support for the author's earlier idea comes from the correlation analysis between the variables. However, additional testing of the variables using a structural equation model is required to confirm the pertinent hypothesis.

Table 2 Correlation matrix of variables

	Flood disaster risk perception	Public participation	Satisfaction of flood disaster risk prevention regulation	Knowledge of flood disaster risk	Institutional trust	Evaluation of flood disaster risk prevention regulation implementation behavior
Flood disaster risk perception	1.000***					
Public participation	-0.359	1.000				
Satisfaction of flood disaster risk prevention regulation	-0.570***	0.421**	1.000			
Knowledge of flood disaster risk	0.326**	0.384***	-0.336***	1.000		
Institutional trust	-0.279	-0.284	0.373***	-0.309***	1.000	
Evaluation of flood disaster risk prevention regulation implementation behavior	-0.584***	0.477***	0.454***	-0.401***	0.250***	1.000
Gender (female =1)	0.243	0.035	0.128	0.016	0.134	0.122
Age	-0.038***	0.018***	0.023**	0.007	0.046**	0.031**
Personal annual income =1	0.129	0.199	-0.070	0.085	-0.081	-0.067
Educational Degree	0.274	0.263	-0.013	0.195**	-0.017	-0.021
Investigation Place (Western Urban =1)	0.136***	0.182***	-0.055	0.127**	-0.060	-0.073

Note: ＊＊＊ ＊＊, and ＊ mean p < 0.01, p < 0.05 and p < 0.1 respectively. (The same as the following tables)

Table 3 Structural equation model of the evaluation of government flood disaster risk prevention regulation implementation

	Evaluation of flood disaster risk prevention regulation implementation behavior		Satisfaction flood disaster risk prevention regulation implementation	
	Coefficient	Cluster robust standard error	Coefficient	Cluster robust standard error
Flood disaster risk perception	-0.584**	0.0617	-0.570***	0.1171
Public participation	0.477**	0.1165	0.421**	0.1223
Satisfaction of flood disaster risk prevention regulation implementation	0.454**	0.0872	……	……
Knowledge of flood disaster risk	-0.401***	0.1224	-0.336***	0.0675
Institutional trust	0.250***	0.0573	0.373***	0.0680
Evaluation of flood disaster risk prevention regulation implementation behavior	…….	…….	0.454***	0.0722
Gender (female =1)	0.122	0.1276	0.128	0.0555
Age	0.031**	0.0098	0.023**	0.0117
Personal income (=1 *)	-0.067	0.0694	-0.070	0.0143
Educational level	-0.021	0.0015	-0.013	0.0019
Place of investigation (Western Urban =1)	-0.073	0.0253	-0.055	0.0251
Coefficient of determination	0.728			
RMSEA	0.049			

Table 4 Results of multiple regression analysis

Variable	Governance satisfaction (GS)	Evaluation of Government Flood Disaster Risk Regulation Implementation Behavior									
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
FRP	-0.570***		-0.584**			-0.259**					
PP		0.421**		0.477**			0.191*				
GS					0.454**						
ERP* FK								-0.153 ***			
PP* FK									0.107 ***		
FRP* IT										0.169 ***	
PP* IT											0.071***
Female	0.180	0.173	0.186	0.166	0.172	0.131	0.183	0.122	0.172	0.173	0.182
Age	0.041**	0.062**	0.069**	0.032**	0.043**	0.032**	0.044**	0.043**	0.061**	0.038**	0.042**
Income 1	-0.099	-0.083	-0.089	-0.092	-0.093	-0.031	-0.089	-0.067	-0.023	-0.090	-0.097
ED	-0.027	-0.033	-0.023	-0.029	-0.031	-0.020	-0.024	-0.031	-0.022	-0.039	-0.028
Western Urban	-0.098	-0.091	-0.083	-0.088	-0.073	-0.039	-0.097	-0.093	-0.080	-0.082	-0.091

FRP = Flood risk perception, PP= Public participation, GS = Governance satisfaction, FK= Flood knowledge, IT=Institutional trust, Income = 1, ED=Educational level.

The structural equation model and multiple regression analysis results are presented in Tables 3 and 4. The findings of the structural equation model are discussed as follows. The coefficient of determination is 0.728, and the standardized root mean square residual (RMSEA) is 0.049, which suggests that the model fits well.

Models 1 and 2 focus on the effects of public engagement and perceived flood risk on public satisfaction with government regulations for preventing flood disasters. Hypothesis 3 is confirmed because there is a significant negative correlation between public perception of flood disaster risk and satisfaction with the implementation of flood disaster risk prevention regulations. This indicates that the greater the public's perception of flood disaster risk, the more they believe that the performance of flood disaster risk prevention regulations has had no meaningful results and the lower their satisfaction with the implementation of flood disaster risk prevention regulations. The public's expectations of the Government's performance in implementing flood disaster risk prevention regulations are met if satisfaction is enhanced, which results in a better rating. As a result, hypotheses 4 and 5 are confirmed. Models 3 and 4 show a negative correlation between public perception of flood disaster risk and the behavior associated with implementing flood disaster risk prevention regulations. This implies that the greater the public perception of flood disaster risk, the lower the public perception of the behavior associated with implementing flood disaster risk prevention regulations. In the meantime, hypothesis 1 is confirmed because the direct effect outweighs the indirect impact. The evaluation of flood disaster risk prevention regulation implementation behavior can be positively influenced by public participation, which demonstrates that the higher the level of public participation, the higher the evaluation of flood disaster risk prevention regulation implementation behavior. Additionally, hypothesis 2 is confirmed because the direct effect is more significant than the indirect effect.

Model 6 demonstrates that adding the variable of satisfaction with government flood disaster risk prevention regulation reduces the impact of the independent variable of flood disaster risk perception on evaluating government flood disaster risk prevention regulation implementation behavior. This finding indicates that there is a significant partial mediating effect between.

Model 7 also demonstrates that adding the variable of flood disaster risk prevention regulation satisfaction reduces the impact of the independent variable, public participation on the evaluation of government flood disaster risk prevention regulation implementation behavior, indicating that there is a significant partial mediating effect between public participation and the assessment of government flood disaster risk prevention regulation implementation. Combining H6a, H6b, and the mediating result of satisfaction with flood disaster risk prevention regulations supports hypothesis 6.

Model 8 demonstrates that the dependent variable is negatively impacted by the interaction between perception of flood disaster risk and knowledge of flood disaster risk, and the effect's significance is increased. Hypothesis 7 is confirmed by Model 9 because it demonstrates that the interaction between public engagement and knowledge of flood catastrophe risk has a negative impact on the dependent variable and improves the significance of the effect. Model 10 demonstrates that the interaction between institutional trust and perceived flood catastrophe risk favorably affects the dependent variable, enhancing the impact's effectiveness. The effect of the interaction between institutional trust and public engagement on the dependent variable is negative, as shown by Model 11, and the impact's significance is increased, supporting Hypothesis 8.

The appraisal of the behavior associated with the execution of flood disaster risk prevention regulations and the satisfaction with the implementation of flood disaster risk prevention regulations are both significantly influenced by control variables. Young people have a higher perception of their health and have higher requirements for flood disaster risk prevention regulation implementation. The higher the educational level, the more attention will be paid to flood disaster risk prevention knowledge and information, the higher the flood disaster risk prevention awareness, and the higher the perception of flood disaster risk. Therefore, in comparison to the older population, they have higher expectations for the impact of government regulations aimed at preventing flood disasters; the higher one's income, the higher one's

expectations for the implementation of such rules, and the higher one's perception of the risk of a flood disaster; Public perception of flood disaster risk varies depending on where people live; in contrast, western urban residents perceive flood disaster risk as being more serious; females are generally more willing to participate in activities aimed at reducing flood disaster risk as well as the evaluation of regulations aimed at reducing flood disaster risk through a variety of channels.

4.3.2 Robustness Test

The two questions used in the questionnaire to assess the "efficiency of public participation" are substituted in this section using the method of variable replacement, and the original elements of the petition were replaced by the pertinent items of the flood disaster risk lawsuit (F10 and F11). Aside from petitions, court litigation is a relatively widespread type of public participation. The timeliness and the court's enforcement efforts when the public participates in flood disaster risk prevention through litigation are covered in questions F10 and F11 in module F of the STATSL2020 questionnaire, demonstrating the procedure's efficacy and the outcomes of public participation. To gauge the robustness of public participation, the two dimensions were replaced. The outcomes are mainly in line with Table 4. As a result, this component of the thesis' models and empirical analysis' findings are very robust.

5. RESULTS

5.1 Reducing Public High Flood Risk Perception and Improving Participation

Public engagement and the flood risk perception are intimately tied to political trust. The Government earns the public's trust by improving the environment for flood catastrophe risk prevention and showing the public how regulations are implemented. To lessen the likelihood that the public may perceive a high flood disaster risk and to encourage public participation, the following actions can be suggested: First, the administration needs to expand channels for public engagement and boost dialogue and connection with the general population. Second, they should direct the media to constructively disseminate flood disaster prevention information and knowledge. Third, the Government should provide legal guarantees for public participation to ensure the standardization and legalization of public participation. Fourth, they should focus on improving public awareness of the Government's ruling ability and increasing public trust and satisfaction. The Government must provide reliable information release systems and communication channels to ensure the public is adequately informed on flood catastrophe avoidance. The public's capacity to detect and filter information will grow as their knowledge of flood disaster avoidance does, which will help to encourage public behavior that reduces the danger of flood disasters.

5.2 Improving the Evaluation of Flood Risk Prevention Regulation Implementation

The flood risk prevention regulation performance evaluation aims to replace the conventional GDP-only criterion and emphasize ecological flood risk prevention. As a result, the following recommendations are made: First, the Government must improve assessment processes, accountability, and efficacy in mitigating flood disaster risk. They should divide up regional primary functional areas' responsibilities, improve the assessment process, and encourage the Government to prioritize flood disaster risk reduction and community demands for disaster risk prevention. Second, the Government needs to improve the evaluation of its officials, using the evaluations of all parties as well as indicators connected to the protection against flood catastrophe risk. Third, the Government should establish a market-oriented flood disaster risk protection model and optimize resource allocation. This can inspire the endogenous power of businesses, various organizations, and the public to protect the environment. These measures include encouraging the public to participate in assessment, implementing comprehensive ecological management, and conducting daily inspections.

5.3 Enhancing the Efficiency of Government Flood Disaster Risk Prevention Regulation to meet Public Safety

The public views the lovely natural environment as a significant component of the high quality of their living standards at the complete high-quality development stage. Environmental governance has responded to the people's persistent pursuit of a high quality of life as their expectations of the environment progress into the set of "striving for ecology" and "environmental protection." As a result, the Government may implement the following actions: First, by strengthening the mechanisms for public participation, it will not only protect the public's right to petition and make claims, but it will also help to create flood disaster protection organizations that can work as a link between the public and the Government by effectively carrying out flood disaster prevention supervision. For the public to participate more actively and effectively in their supervisory process, a hotline and e-mail boxes are encouraged for reporting problems related to flood disasters. Second, the government should develop the idea of being "service-oriented," enhance environmental administrators' personal qualities and awareness of serving, and foster staff members' capacity to address flood disaster-related issues of public concern promptly and effectively. Third, the Government should increase ecological and environmental administrative offices and inspection teams, upgrade technical equipment, and improve professional leadership and business capabilities, further accelerating the construction of ecological civilization and flood event control. They should also fully realize a law-based administration and enhance the quality of service.

6. CONCLUSIONS AND INNOVATION POINTS

6.1 Conclusions

The research on flood risk perception and government regulation implementation in Freetown Municipality concludes that public participation, satisfaction with government actions, and institutional trust are critical factors influencing public perception of flood risk. The study's quantitative analysis reveals a significant correlation between these variables, with higher levels of public engagement and trust correlating with lower perceptions of flood risk. This suggests that when people are more involved in risk prevention measures and have greater trust in institutions, they perceive their risk as lower.

The structural equation model further confirms the negative impact of perceived flood risk on evaluating government regulation implementation. This indicates that the more at-risk people feel, the more critical they are of government efforts. Conversely, increased knowledge about flood disaster risk prevention and higher institutional trust positively influences the public's satisfaction with government regulations.

The research underscores the necessity of inclusive and transparent communication strategies to improve public trust and encourage proactive community involvement in disaster risk management. Education on flood risk prevention and consistent, constructive feedback on government efforts can enhance public perception and lead to more effective policy implementation.

Overall, the findings advocate for a collaborative approach to flood risk management, emphasizing the role of government transparency, public education, and community engagement in improving both the perception and reality of flood risk management. This collaborative approach can increase government performance satisfaction, ultimately contributing to a more resilient and prepared society.

6.2 Innovations in Flood Risk Management Research

The innovation point of this research lies in its empirical demonstration of the complex interplay between institutional trust, public participation, and flood risk perception. By employing a structural equation model, the study illuminates these factors' direct and indirect effects on the evaluation of government flood disaster prevention regulation implementation. The analysis highlights that institutional trust can significantly modulate the relationship between public participation and flood risk perception, thereby shaping satisfaction with government measures. This nuanced understanding can drive the development of more sophisticated, trust-enhancing strategies in flood risk management, leading to more significant public support for government initiatives and more robust community resilience.

7. IMPLICATIONS AND RECOMMENDATIONS

7.1 Theoretical Implications

The study contributes to the theoretical understanding of flood risk perception by highlighting the complex interplay between individual experiences, knowledge, and institutional trust. It underscores the need to incorporate diverse socio-demographic factors in risk perception models. The research provides insights into how government regulation impacts public perception of flood risks. This enriches the theoretical discourse on environmental policy and public compliance, demonstrating that effective regulation can shape public attitudes and behaviors toward environmental hazards. The findings suggest that increased public knowledge about flood risks and greater trust in institutions can lead to more accurate risk perceptions. This adds to theories about the role of information dissemination and trust-building in environmental management. The study extends theoretical knowledge by showing how age, income, and education influence environmental risk perceptions. This has implications for theories related to environmental psychology and social vulnerability to natural disasters.

7.2 Practical Implications

Given the varying levels of risk perception across different demographic groups, government agencies, and NGOs should design tailored public awareness and education programs that address specific concerns and knowledge gaps. The study's insights into the public's perception of government regulations can guide policymakers in formulating and implementing more effective flood risk management strategies. This includes developing policies that are both environmentally sustainable and socially acceptable. The findings emphasize the importance of engaging communities in developing and implementing flood risk management initiatives. Involving local populations can ensure that policies are well-informed and more likely to be supported and adhered to. The study highlights the need for governments to build and maintain public trust. This can be achieved through transparent decision-making, regular communication about flood risks, and demonstrating accountability in environmental management. Understanding the differential impact of flood risk perception based on socio-demographic factors can help allocate resources more effectively. For instance, allocating more resources to educate and protect more vulnerable groups, such as those with lower income or education levels.

7.2 Recommendations

7.2.1 Recommendations for Government:

Increase transparency in flood disaster risk prevention efforts to build institutional trust, as higher trust correlates with better public perception and cooperation—Foster public engagement in flood risk management processes to encourage shared responsibility and increase regulation compliance. Provide accessible and transparent information about flood risks and prevention strategies to improve the public's knowledge and preparedness. Tailor communication strategies to different demographics, considering gender, age, income, and education levels, to address the varying perceptions and needs effectively.

7.2.2 Recommendations for Managers

Involve employees at all levels in developing criteria for performance appraisals to ensure that the processes are fair and representative. Utilize performance appraisals to identify areas for employee development and provide targeted training programs. Establish clear and constructive feedback channels to help employees understand appraisal outcomes and expectations.

7.2.3 Recommendations for the Public

Participate in community-based flood risk management programs and decision-making to address personal needs and perceptions. Engage in programs about flood prevention and response to be better prepared and informed. Communicate needs and concerns to local authorities and government bodies, especially in the event of dissatisfaction with flood management efforts.

The recommendations are derived with an understanding that each group has a role in enhancing flood risk management and that these roles are interconnected. To be effective, the government's policies and programs must be supported by managers' implementation and the public's active participation.

8. LIMITATIONS AND FUTURE DIRECTIONS

8.1 Limitations

The study primarily focuses on the Freetown Municipality, which may not represent the entire Sierra Leone population's perceptions and experiences. The data reflects a specific point in time and may not capture changes in perceptions or the impact of ongoing or future government regulations. Reliance on self-reported measures can introduce bias, as responses might be influenced by current emotions or the desire to conform to social expectations. A higher percentage of male respondents could skew the results because flood risk perceptions differ between genders.

8.2 Future Directions

To assess how flood risk perception and the effectiveness of government regulations evolve. Expanding the study to include other regions in Sierra Leone or similar countries to validate the findings. Incorporating in-depth interviews or focus groups to gain nuanced insights into individual and community-level perceptions and behaviors. Conducting gender-focused studies to understand how flood risk perception and responses might differ between men and women. Exploring the long-term effects of specific government policies on public perception and flood management outcomes.

Availability of data and material section

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical considerations but are available from the corresponding author upon reasonable request. This complies with the participating institutions' data protection policies and our research's ethical guidelines. Specific data subsets or analytical methods used in the study can be provided upon verified academic request, ensuring all data sharing complies with applicable data protection laws and institutional policies.

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