Response to Flood Early Warning Messages among Residents of Flood-Prone Areas in Jalingo Metropolis

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Abstract
Flood early warning systems (FEWS) are central to disaster risk reduction; however, their effectiveness depends not only on technical accuracy but also on how warnings are received, trusted, and acted upon by vulnerable populations. This study assesses residents' responses to flood early warning messages in flood-prone areas of Jalingo Metropolis, Taraba State, Nigeria, with specific focus on communication channels, message believability, and attitudinal disposition. Adopting a quantitative cross-sectional survey design, data were collected from 400 residents selected through multi-stage sampling in high-risk communities along the Rivers Lamurde and Mayogwoi. Descriptive statistics were used to analyse patterns of exposure, credibility assessment, and attitudes towards flood warnings. Findings reveal that radio remains the predominant channel for warning dissemination (75.25%), confirming its continued relevance in disaster communication. However, despite high exposure, residents exhibit a predominantly sceptical perception of flood warnings, with 53.75% reporting only moderate believability and poor attitude to the messages. Item-level analysis indicates that past experiences of "false alarms," low trust in government agencies, and preference for traditional authorities significantly undermine warning credibility. It recommends a hybrid, community-embedded communication approach to enhance credibility and behavioural responsiveness.

Keywords: Flood early warning; risk communication; message believability; response; Jalingo Metropolis; Nigeria.

Introduction

Flooding remains the most pervasive and destructive natural hazard globally, accounting for approximately half of all disaster-related events and causing significant socio-economic disruption (World Meteorological Organization [WMO], 2021). In the wake of intensifying climate change, the frequency and magnitude of extreme hydrological events have escalated, particularly in sub-Saharan Africa, where rapid urbanization and inadequate infrastructure exacerbate vulnerability (Adedeji et al., 2020; UN-Habitat, 2022). To mitigate these impacts, the Sendai Framework for Disaster Risk Reduction 2015–2030 emphasizes the transition from reactive disaster response to proactive risk management through the implementation of "people-centered" Early Warning Systems (FEWS) (United Nations Office for Disaster Risk Reduction [UNDRR], 2015).

In Nigeria, the devastating floods of 2012 and 2022 which collectively displaced millions and resulted in billions of dollars in economic losses highlighted critical deficiencies in the nation's disaster preparedness (National Bureau of Statistics [NBS], 2023; Oruonye, 2015). Despite the periodic issuance of flood outlooks by the Nigerian Meteorological Agency (NiMet) and the Nigeria Hydrological Services Agency (NIHSA), the translation of these warnings into effective local action remains inconsistent.

Research suggests that the efficacy of an early warning system is not solely dependent on its technical accuracy but on how the "end-users" the residents perceive, interpret, and respond to the messages (Basher, 2006; Mileti & Sorensen, 1990).

Taraba state and Jalingo Metropolis in particular, is a critical case study for flood vulnerability. The city's unique topography, characterized by an undulating plain traversed by the Rivers Lamurde and Mayogwoi, makes it highly susceptible to flash floods (Abbas, 2012; Oruonye & Abubakar, 2018). While the Taraba State Emergency Management Agency (SEMA) utilizes various channels such as radio jingles and community advocacy to disseminate warnings, residents in high-risk informal settlements continue to suffer recurring losses. Previous studies in Jalingo have largely focused on the physical mapping of flood-prone areas or the socio-economic impacts of past events (Oruonye, 2015; Abbas, 2012). However, there is a significant dearth of empirical data regarding the behavioral responses of residents to specific warning messages. This knowledge gap is critical; even the most sophisticated satellite-derived forecast is useless if residents ignore the message due to lack of trust, linguistic barriers, or "warning fatigue" (Slovic, 2000; Twigg, 2015). Therefore, it is imperative to investigate the factors that influence whether a resident in Jalingo chooses to evacuate, protect property, or remain indifferent when a warning is received. The primary objective of this study is to assess the responses of residents in flood-prone areas of Jalingo Metropolis to flood early warning messages. Specifically, the study seeks to:

1. Identify the predominant channels through which residents receive flood warnings.
2. Examine the level of believability of flood early warning messages.
3. Analyze the attitude of the residents toward flood warning messages.

Literature Review

Flood and Floor Early Warning System (FEWS)

Flooding is usually defined as a temporary state in which normally dry land areas are partially or completely inundated by the overflow of inland or tidal waters (Kron, 2005; WMO, 2021). However, in the field of Communication and Development Studies, a flood is seen as a "socially constructed disaster" that occurs when adverse weather impacts weak human systems and information does not flow effectively (Sivapalan et al., 2012; Di Baldassarre et al., 2013). In Nigeria, flooding is further categorised by its onset, specifically flash floods, which are characterised by high-velocity water movement and minimal lead time, making the speed and clarity of communication the primary variables for survival (FEMA, 2023; Oruonye, 2015). From this perspective, a flood is not just water; it is a breakdown in the balance between a community and its environment. This is often exacerbated by a failure in communication, where residents' subjective risk perception does not align with the objective physical hazard (Beck, 1992; Mileti & Sorensen, 1990). Therefore, to define a flood in Jalingo, it is necessary to understand the hazard–exposure–vulnerability triad. Communication is the most important means of reducing vulnerability by transforming abstract hydrological data into useful, lived knowledge (UNISDR, 2015).

On the other hand, the Flood Early Warning System (FEWS) is a strategic effort aimed at ensuring that citizens are resilient to the effects of climate change (World Meteorological Organisation, 2020). Through this system, governments and other stakeholders ensure that citizens are informed about potential and imminent extreme events in order to prevent the loss and damage associated with such events. The United Nations (2022) notes that "a successful FEWS saves lives and jobs, land and infrastructure, and supports long-term sustainability. Early warning systems will assist public officials and administrators in their planning, saving money in the long run and protecting economies". The Flood Early Warning System (FEWS) is a critical resilience-building strategy in this anthropogenic era, characterised by increasingly frequent and more dangerous flooding situations. FEWS is a multidisciplinary framework that brings together four interrelated

components: risk knowledge, monitoring and forecasting, dissemination and communication, and response capability (Basher, 2006; UNDRR, 2015). The End-to-End model represents how the system is viewed from a communication perspective. This model posits that a forecast is only useful when it is effectively communicated to, and acted upon by, the vulnerable population (Perera et al., 2020). In Nigeria, the system is frequently criticised for being top-heavy, as advanced meteorological data from agencies such as NiMet (monitoring) do not effectively translate into people-centred alerts at the community level (dissemination), resulting in a disconnect that undermines the efficacy of the technical infrastructure (Salihu, 2021).

Review of Empirical Studies

Existing empirical evidence underscores a complex, multi-layered communication system regarding the channels through which residents in flood-prone regions receive early warning messages. Talib et al. (2025) and Ojo (2024) highlight the primacy of radio, noting its communicative effectiveness due to its portability and reach in areas with limited infrastructure. This traditional dominance is echoed by Ternenge et al. (2024), who found a high level of public exposure to radio for flood forecasts across high-risk Nigerian states such as Adamawa and Benue, although they caution that the frequency of these broadcasts is often insufficient to trigger a significant response. Conversely, a shift towards digital and interpersonal platforms is emerging; Ocheke and Agbanu (2025) identified social media as the most utilised medium among farmers in Anambra North, emphasising its role in establishing message credibility. This is further nuanced by Modeyin et al. (2025), who found that while traditional and new media are widely explored, residents prioritise interpersonal and customary channels such as town spokespersons and group communication for practical disaster exchange. Analytically, these studies suggest that while radio remains a foundational pillar for reach, the "predominant" channel is increasingly becoming a hybrid of digital alerts and indigenous interpersonal networks, which residents perceive as more credible and actionable during the "last-mile" phase of a flood event.

Studies that examined audience believability of flood early warning systems also exist. Ben-Enukora et al. (2023) and Adekola et al. (2022) demonstrate that a "crisis of confidence" in government institutions often leads residents to exhibit optimism bias, discounting official scientific forecasts in favour of personal environmental observations. This scepticism is further nuanced by Modeyin et al. (2025) and Ternenge et al. (2024), whose findings indicate that while broadcast media like radio have high reach, they suffer from a perceived lack of urgency, causing residents to prioritise the believability of interpersonal and customary channels, such as traditional rulers, over state-sponsored alerts. Furthermore, Ocheke and Agbanu (2025) empirically establish that believability is closely tied to the perceived practicality of the message; warnings that fail to provide tangible evacuation solutions or socio-economic support are frequently dismissed as non-credible. Collectively, these studies argue that for residents in flood-prone zones, believability is a socio-psychological filter moderated by past experiences of "false alarms" and the degree of local context embedded within the message.

Furthermore, prior empirical evidence underscores that the attitudinal disposition of Nigerians towards flood early warning messages is characterised by a complex interplay of fatalism, scepticism, and normalisation. Studies by Agbola et al. (2020) and Okaka and Nagu (2020) reveal a prevalent "wait-and-see" attitude, where residents often harbour a fatalistic belief in flooding as an unavoidable act of God, leading them to prioritise physical environmental cues over proactive media alerts. This passive orientation is exacerbated by what Amoako (2022)

categorises as the normalisation of risk a psychological hardening where frequent exposure to perennial flooding fosters an attitude of indifference rather than increased readiness. Furthermore, Nkwunonwo et al. (2021) and Oloke et al. (2023) empirically demonstrate that previous "false alarms" and the perceived abstract nature of technocratic warnings have cultivated a deep-seated scepticism towards government forecasts. Consequently, residents often exhibit a negative attitude towards preemptive evacuation, choosing instead to protect property due to a lack of institutional trust, thereby rendering many formal communication efforts ineffective at the psychological level.

While existing studies have extensively documented the socio-psychological barriers to flood response in Southern Nigeria and the Niger Delta, there remains a critical dearth of empirical data specifically addressing the flash-flood-prone areas of Taraba state especially Jalingo Metropolis which is the state capital. Furthermore, the transition from the dissemination of warning messages to the adoption of the messages remains poorly understood, as previous research has focused primarily on physical mapping. This study, therefore, fills a vital gap by providing a localised, communication-centred assessment on the subject matter.

Theoretical Framework

The theoretical framework for this study is anchored on Cognitive Dissonance Theory (CDT), a cornerstone of social psychology and mass communication scholarship originally proposed by Leon Festinger (1957). The theory is built on the basic assumption that individuals possess an inherent drive to maintain internal consistency among their cognitions; when a person holds two or more contradictory beliefs, ideas, or values or is faced with new information that conflicts with existing beliefs they experience a state of psychological discomfort known as "dissonance" (Festinger, 1957). In the context of disaster communication, this occurs when a flood warning (new information) contradicts a resident's desire to remain in their home (existing cognition). To resolve this tension, individuals may employ various strategies such as selective exposure, where they ignore the warning, or rationalisation, where they downplay the severity of the threat to maintain mental equilibrium (Harmon-Jones & Mills, 2019). Despite its predictive power, CDT has faced criticisms, notably from Tedeschi et al. (1971), who argued that observed responses might be a result of impression management appearing consistent to others rather than internal conflict resolution. Furthermore, the theory is often critiqued for the difficulty in directly measuring an internal psychological state. However, its primary strength lies in its ability to explain seemingly irrational human behaviour and the "action-silence" gap that purely rational models fail to address (Aronson, 1992).

Empirically, CDT has been widely applied in disaster studies to investigate why populations at risk reject life-saving information. For instance, McClure et al. (2015) and Dickson-Swift et al. (2014) utilised the theory to demonstrate that when individuals are unable to perform a protective action due to resource constraints, they resolve the resulting dissonance by convincing themselves the disaster is unlikely to occur. Within Nigeria, the theory provides a lens to understand the findings of Agbola et al. (2020) regarding fatalistic attitudes as a psychological defence mechanism. In the current study of Jalingo Metropolis, CDT is linked as a primary explanatory tool for the residents' responses to flood early warning messages. It is applied to evaluate how the conflict between the official alert and the socio-economic inability to evacuate triggers dissonance-reduction strategies.

Methodology

This study adopts a quantitative research design utilizing a cross-sectional descriptive survey. The target population comprises the approximately 236,100 inhabitants of Jalingo Metropolis, with a specific focus on those residing in high-risk zones along the banks of the Rivers

Lamurde and Mayogwoi. Using the Cochran (1977) formula, a sample size of 400 respondents was determined to ensure statistical representativeness. A multi-stage sampling technique was employed, beginning with the purposive selection of flood-prone wards based on historical hazard data, followed by systematic household sampling to ensure an even spatial distribution of participants across the identified risk areas. The primary research instrument is a structured questionnaire. Data collection was carried out through face-to-face administration. The collected data were analysed using frequency counts, percentages, and mean scores.

Data Presentation

Table1. Demographic Profile of Respondents

Items	Responses	*n*=400	Percentage (%)
Gender	Male	218	54.5
	Female	182	45.5
Age Group	18–25 years	64	16.0
	26–35 years	122	30.5
	36–45 years	108	27.0
	46 years and above	106	26.5
Education	No Formal Education	52	13.0
	Primary/Secondary	194	48.5
	Tertiary	154	38.5
Occupation	Civil Servant	86	21.5
	Trading/Business	148	37.0
	Farming	94	23.5
	Artisan/Unemployed	72	18.0
Length of Residency	Less than 5 years	42	10.5
	5–10 years	98	24.5
	Above 10 years	260	65.0

Source: Field Survey, 2025

The demographic data presented in Table 1 reveals a majority (65%) of respondents having resided in the Jalingo Metropolis for over a decade. This high level of residency suggests that the cohort possesses considerable knowledge of the local recurrent flash floods. The gender distribution is relatively balanced, with a slight male majority (54.5%), while the age profile indicates a mature demographic, as 57.5% of respondents fall within the 26–45 age bracket. Educationally, the sample is largely literate, with 87% having attained at least a primary or secondary education, which is critical for the comprehension of written or broadcast alerts. However, the occupational data shows that 60.5% of respondents are engaged in trading or farming sectors highly sensitive to environmental disruption implying that any decision to evacuate involves a significant cognitive conflict between personal safety and the preservation of livelihood assets.

Table 2. Predominant Channels of Flood Early Warning Reception

Channel	*n*=400	Percentage (%)
Radio	301	75.25
Television	101	25.25
Neighbours and Friends	89	22.25
Social Media	56	14.00
Community Leaders	41	10.25
Religious Gatherings	23	5.75
Posters and Handbills	8	2.00
Newspaper	7	1.75
Town Crier	4	1.00
Billboard	2	0.50

Source: Field Survey, 2025

The data in Table 3 reveals a tiered communication ecology dominated by broadcast media, with radio emerging as the primary conduit for flood risk information, reaching 75.25% of the sampled population. This finding corroborates the enduring primacy of radio in Nigerian disaster contexts due to its low cost and high penetration. However, the high frequency of reliance on neighbours and friends (22.25%) and community leaders (10.25%) suggests a significant interpersonal channels. Interestingly, despite the global shift towards digitisation, social media (14.00%) and television (25.25%) remain secondary to radio, while traditional print and outdoor media like billboards and newspapers appear largely inconsequential for flash-flood warnings.

Table 3. Level of believability of flood early warning messages

Level of Believability	Frequency	Percentage (%)
Very Low	12	3.00
Low	102	25.5
Moderate	215	53.75
High	48	12.00
Very high	23	5.75
Total	400	100

Source: Field Survey, 2025

The data in Table 3 indicates that a significant majority of respondents possess a sceptical perception of flood warning messages, with 53.75% of residents reporting a moderate level of believability and very high and high believability accounted for 5.75% and 12.00% respectively. The result suggest a profound disconnect between the dissemination of flood early warning messages and acceptance as credible intelligence.

Table 4. Respondents' Level of Believability of Flood Early Warning Messages

S/N	Item Statement	SA (%)	A (%)	U (%)	D (%)	SD (%)	Mean ($\bar{x}$)	Std. Dev.
1	I believe that flood warnings from government agencies are always accurate.	5.0	12.5	10.0	42.5	30.0	2.20	1.12
2	I trust the traditional rulers' word on floods more than radio announcements.	45.0	30.0	5.0	12.5	7.5	3.93	1.28
3	Past "false alarms" have made me doubt the seriousness of current warnings.	50.0	25.0	8.0	10.0	7.0	4.01	1.25
4	I believe the flood alerts are exaggerated to create unnecessary fear.	35.0	32.5	15.0	10.0	7.5	3.78	1.21
5	Scientific forecasts are more believable than my personal observation of the river.	8.0	14.5	7.5	38.0	32.0	2.29	1.18

Source: Field Survey, 2025

Decision Rule: *1.00–1.49 (Very Poor), 1.50–2.49 (Poor), 2.50–3.49 (Moderate/Average), 3.50–4.49 (High), 4.50–5.00 (Very High).*

The data in Table 2 indicate a poor level of believability regarding official flood early warning messages among residents of Jalingo. The grand mean of 3.24 (interpreted within the context of scepticism-based items) reveals a "crisis of confidence" in technocratic sources. Specifically, Item 3 recorded the highest mean score ($\bar{x}$ = 4.01), suggesting that previous experiences with "false alarms" have significantly eroded the credibility of current alerts. This is further evidenced by the low mean score for Item 1 ($\bar{x}$ = 2.20), where only 17.5% of respondents expressed agreement with the accuracy of government warnings. Consistent with Cognitive Dissonance Theory, residents appear to resolve the discomfort of threatening information by devaluing the source; a significant majority ($\bar{x}$ = 3.93) find traditional interpersonal channels more believable than broadcast media. Consequently, the reliance on personal environmental cues over scientific forecasts ($\bar{x}$ = 2.29) highlights a psychological barrier in which official communication is dismissed as non-actionable or exaggerated.

Discussion of findings

The findings on predominant channels of flood early warning reception reveal a

communication ecology in Jalingo Metropolis that is strongly dominated by radio, which reached 75.25% of respondents. This confirms the continued centrality of radio in Nigerian disaster communication, particularly in flood-prone urban contexts where affordability, portability, and infrastructural limitations shape media access. This result is consistent with prior studies by Talib et al. (2025), Ojo (2024), and Ternenge et al. (2024), which document radio as the most pervasive medium for flood risk information across high-risk Nigerian states. However, the notable reliance on neighbours and friends (22.25%) and community leaders (10.25%) underscores the importance of interpersonal and customary channels as complementary pathways for risk interpretation and validation, echoing Modeyin et al.'s (2025) observation that mass media primarily create awareness, while interpersonal networks shape meaning and response during the "last-mile" phase of disaster communication. The relatively low uptake of social media (14.00%) and television (25.25%), alongside the near-irrelevance of print and outdoor media, highlights the context-specific limits of digitisation for time-sensitive flash-flood warnings in Jalingo.

With respect to the level of believability of flood early warning messages, the results indicate a predominantly sceptical audience, as the majority of respondents reported only moderate believability (53.75%), while high and very high believability together accounted for less than one-fifth of the sample. This scepticism is further reinforced by item-level responses showing low confidence in government-issued warnings ($\bar{x} = 2.20$) and a strong influence of past "false alarms" in eroding trust ($\bar{x} = 4.01$). These findings align with Ben-Enukora et al. (2023) and Adekola et al. (2022), who identify institutional trust deficits as a critical barrier to the credibility of early warning systems. The preference for traditional rulers over broadcast media ($\bar{x} = 3.93$) and the tendency to rely on personal environmental observation rather than scientific forecasts ($\bar{x} = 2.29$) further corroborate Modeyin et al. (2025) and Ternenge et al. (2024), who argue that believability in flood communication is socially constructed and rooted in experiential and interpersonal validation rather than technical sophistication alone.

Regarding residents' attitudinal disposition towards flood warning messages, the findings suggest a pattern of cautious disengagement shaped by scepticism, risk normalisation, and adaptive rationalisation. The moderate acceptance of warnings reflects a "wait-and-see" orientation previously documented by Agbola et al. (2020) and Okaka and Nagu (2020), where residents delay protective action until physical cues become undeniable. Interpreted through Cognitive Dissonance Theory, this attitude represents a psychological strategy for resolving the tension between threatening flood alerts and residents' limited capacity to evacuate or relocate. Consistent with McClure et al. (2015) and Dickson-Swift et al. (2014), residents appear to reduce dissonance by discounting the credibility of official warnings, perceiving them as exaggerated, or deferring to familiar social authorities.

Conclusion

This study examined residents' responses to flood early warning messages in flood-prone areas of Jalingo Metropolis, focusing on communication channels, message believability, and attitudinal disposition. The findings reveal that while radio remains the predominant channel for flood warning dissemination, exposure to information does not equate to trust or action. A pervasive scepticism towards official flood warnings persists, driven largely by past experiences

of false alarms, low institutional credibility, and the perceived abstract nature of scientific forecasts.

Recommendations

Based on the findings the following are recommended:

1. Flood early warning messages should be co-delivered by trusted community actors such as traditional rulers and ward leaders alongside official agencies. This social authentication directly addresses the low credibility of government warnings identified in the data.
2. Disaster agencies should provide post-warning explanations clarifying why predicted floods did or did not occur. This transparency reduces scepticism caused by past "false alarms," which the findings show as a major source of distrust. Regular feedback helps rebuild long-term confidence in early warning systems.
3. Radio alerts should be immediately reinforced through coordinated interpersonal communication by community leaders and neighbourhood networks. This bridges the gap between high radio reach and low message acceptance observed in Jalingo. The strategy enhances believability by validating broadcast warnings through trusted social channels.

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