

# Assessing Public Perceptions towards Sample Cell Broadcast (CB) Alerts in Nilambur, Kerala

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## Abstract

In times, the utilisation of Cell Broadcast (CB) alerts has emerged as a tool for authorities to quickly share critical information with the public during emergencies. This research paper explores how people perceive and interact with the Sample Cell Broadcast (CB) alerts in Kerala, a region prone to disasters such as floods, landslides and cyclones. Given the frequency of these calamities it becomes essential to have crisis communication strategies in place to minimise human and property losses. Cell Broadcast (CB) alerts play a pivotal role in Kerala's disaster management plan, highlighting the need to examine their reception among the population of the state. Several mobile users in India have received an "Emergency Alert" from the Department of Telecommunication (DoT) in collaboration with the National Disaster Management Authority (NDMA) as part of their efforts to improve emergency communication during disasters. The government launched this initiative back in July 2023. They recently conducted a test broadcast on October 31st. The government has taken this step to improve safety during emergencies. To collect data, two micro Kudumbashree units were selected from the hazard prone Kalikavu Village in Nilambur Taluk, Malappuram District. This study employed a survey method that entailed distributing questionnaires to the participants. Through this approach, the study assessed participants' awareness, perceptions, and experiences with the Sample Cell Broadcast (CB) alerts.

The study offers an exploration of how individuals in disaster-prone regions of Nilambur Taluk perceive Sample Cell Broadcast (CB) alerts, with a focus on factors such as trustworthiness, credibility, and communication strategies affecting the system's functionality. The findings offer insights for disaster management agencies and policymakers not only in Kerala but also, in other similar regions. These insights can help refine communication strategies and improve preparedness. These findings also offer recommendations to enhance communication strategies to improve alert systems and better prepare the public. By understanding how people perceive Cell Broadcast (CB), alerts authorities can improve their crisis communication strategies. This research contributes to the discussions on crisis communication and public perceptions in regions prone to disasters ultimately promoting stronger and more

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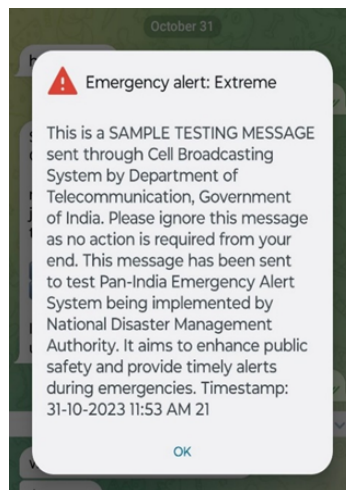
knowledgeable communities.

**Keywords:** Cell Broadcast (CB) Alerts, Crisis Communication, Public Perceptions, Disaster Management, Diffusion of Innovation Theory, Technological Acceptance Model

## Introduction

*Cell Broadcast alerts are the silent messengers that echo through communities, ensuring that in times of crisis, no one is left unheard. -Anonymous*

Between 2018 and 2020, Kerala encountered a string of unprecedented natural disasters, emphasizing the need for effective emergency communication. Despite technological progress, the understanding and use of Sample Cell Broadcast (CB) alerts have not been thoroughly investigated. The objective is to comprehensively explore public perceptions and improve the effectiveness of emergency communication strategies in the region.



*Figure 1. Screenshot of Sample Cell broadcast message received*

Effective communication is crucial in disaster response, guiding communities through uncertain and challenging times. As an anonymous quote wisely reflects, “Cell Broadcast alerts are the silent messengers that echo through communities, ensuring that in times of crisis, no one is left unheard.” Cell Broadcast (CB) alerts have quietly emerged as a vital means of communication during crises. Unlike Short Message Service (SMS) or app-based notifications,

CB alerts uniquely reach a large audience, bypassing mobile network congestion during disasters and operating without requiring recipients to subscribe or opt in, compatible with all devices. These alerts have proven instrumental in sharing crucial information, enabling informed decision-making and necessary actions during crises in various countries.

Widely used in disaster communication, CB alerts play a pivotal role in sharing vital information simultaneously with a large audience, especially crucial when traditional communication channels are disrupted or inaccessible. The popularity and effectiveness of CB alerts have been on the rise, overcoming limitations posed by radio signals or poor cellular reception in certain areas. They swiftly reach audiences, offering an alternative to traditional media like national TV, radio, and print during disaster message dissemination.

Kerala, nestled on the south-western coast of India, is susceptible to a range of hazards, including floods, landslides, and tropical cyclones. Leveraging the potential of Sample Cell Broadcast (CB) alerts in such a dynamic environment holds the promise of revolutionizing emergency communication strategies. The unique geographical characteristics of the state such as its areas, dense forests and network of rivers make it more vulnerable to disasters. In the context of Kerala, there has been a notable shift in the mood, character, and pattern of rainfall across the state, resulting in tragic loss of life and extensive destruction. Since 2018, climate-change induced floods and landslides have plagued various regions of Nilambur in the Malappuram District, jeopardizing public safety. The importance of Cell Broadcast (CB) alerts in swiftly disseminating vital information is accentuated in light of this circumstances. As the first line of defence against natural disasters becomes increasingly reliant on digital communication platforms, understanding the nuances of public perception is paramount for refining and optimizing these alert systems.

This study aims to assess how the women in Kudumbashree units of Nilambur Taluk perceive Sample Cell Broadcast (CB) alerts. In those areas where a significant portion of the population resides in landslide and flood prone zones, understanding how people perceive and interact with CB alerts can provide insights into the effectiveness of this emergency communication tool. This investigation also seeks to contribute to the broader discourse on emergency communication by evaluating whether Sample Cell Broadcast (CB) alerts surpass traditional channels in terms of speed and reliability. The literature surrounding emergency alert systems is vast, but insights specific to the context

of Kerala are scarce. Consequently, this study will fill a significant gap in the existing research landscape by providing region-specific findings that can inform policy-makers, emergency responders, and technology developers alike. Through a multidimensional examination encompassing public awareness, technological efficacy, and emotional responses, this research aims to offer valuable insights that pave the way for the evolution of emergency communication strategies in Kerala and potentially beyond.

## **Literature Review**

Throughout history, the development of emergency communication technologies has showcased humanity's efforts to improve readiness, response, and resilience when dealing with disasters and emergencies. Traditional systems, such as bells and visual signals, were limited in reach and speed. Modernization began with radio and television broadcasts, followed by automated telephone alerts. These methods, while effective, lacked scalability and real-time targeting. But, CB alerts emerged as a game-changer. Leveraging cell networks, they swiftly broadcast location-specific messages to multiple devices. Advantages include rapid dissemination, precise geographic targeting, and inclusivity across various mobile devices.

However, challenges like privacy concerns and technological limitations persist. Despite this, the transition to CB alerts signifies a move toward efficient, targeted, and scalable emergency communication, demanding ongoing innovation for greater effectiveness. Also, understanding how individuals perceive and respond to emergency is crucial for crafting effective alert systems that resonate with the public, ensuring prompt and appropriate responses during emergencies. Researchers have extensively studied the processes that individuals undergo when they receive CB alerts. This process is often described as a series of steps (Lindell and Perry, 2011; Mayhorn and McLaughlin, 2014; Wood et al., 2018). Usually, when alerts are triggered, they evoke emotions such as fear, stress, and anxiety (Cvetković, 2021). People may also experience scepticism, disbelief, or denial when they read these messages (Drabek and Stephenson, 1971; Vermeulen, 2014). Moreover, individuals might feel the need to confirm the authenticity of the messages by checking with others around them. They may reach out to friends or family members to verify if they have received the message (Fenet and Daudé, 2021).

When creating an emergency alert, it is crucial to consider factors like the level of trust in the sender, language used in the message, the emotions that may evoke in readers, and demographic parameters such as age, ethnicity, length of residence etc. These considerations help to ensure that people comprehend the message effectively and respond appropriately (Morss et al., 2018; Lindell, 2017b).

Recent surveys have also examined how the public perceives emergency alerts. These studies often involve collaborations with providers and civil authorities (Kim & Lee 2021b; Bean et al., 2022; Douvinet et al., 2022; Smith et al., 2022).

Bean et al. (2016) discovered that unclear hazard descriptions and insufficient information can cause confusion and raise doubts about the authenticity of an alert. Meanwhile, according to a study conducted by Kim et al. (2019), it was observed that people's reactions to content are influenced by both environmental factors and the content itself.

In another survey carried out by Cain et al. (2021), they recruited 404 students from a university in the United States. Placed them in various scenarios to gauge their responses. The results of the study showed that both content and spatial information play a role in enhancing the perception of danger. Similarly, Smith et al. (2022) conducted a study involving 80 students who received flood alerts through CB systems. Interestingly, 34% of the volunteers considered the instructions to be positively received.

Douvinet et al. (2022) focused on observing 51 university students who received fire alerts through CB systems. Surprisingly, 43 participants found the sound of these alerts to be extremely unpleasant. However, it is important to note that these studies have limitations in terms of representing a population as they have not been conducted on a large scale yet.

A noteworthy common finding across all these studies is that when recipients receive loud tone alerts (for countries adhering to CAP standards), their body language indicates discomfort and disturbance. Some participants physically recoiled from their devices, covered their ears, or displayed expressions of pain or discomfort (Smith et al., 2022). It's important to note that these studies examined responses to situations.

## Rationale of the Study

The rationale behind this study stems from the need to bridge the gap between the technological innovations in disaster communication and the diverse needs of local communities. The broader context of the study can be outlined as follows:

**i) *Increasing Reliance on Digital Communication in Emergencies:*** The global trend towards an increasing reliance on digital communication for emergency information dissemination is a crucial backdrop for our study. With the widespread use of mobile devices and advancements in technology, digital platforms play a pivotal role in delivering timely and critical information during emergencies.

**ii) *Unique Socio-Cultural and Geographical Attributes of Kerala:*** The specific socio-cultural and geographical characteristics of Kerala contribute to the uniqueness of our study. Kerala's diverse population, multilingualism, and susceptibility to various natural disasters create a distinct context for emergency communication. This context highlights the need for tailored and culturally sensitive approaches to alert systems.

**iii) *Global Concerns about Disaster Preparedness and Response:*** Globally, there is a growing emphasis on disaster preparedness and response. The effectiveness of communication strategies during emergencies is a critical aspect of this preparedness. Insights gained from this study in Kerala can contribute not only to the local context but also to broader discussions on improving emergency communication worldwide.

## Research Objectives

1. To assess public awareness and perceptions of Sample Cell Broadcast (CB) alerts as a means of receiving emergency information during disasters.
2. To evaluate the effectiveness of Sample Cell Broadcast (CB) alerts in delivering timely and critical information during emergencies and to determine whether they are considered more reliable and faster than other communication channels.
3. To understand the emotional responses and first impressions of public upon receiving Cell Broadcast (CB) alerts.

## **Theoretical Framework**

The study draws theoretical guidance from the Diffusion of Innovation theory as well as Technology Acceptance Model (TAM), enriching the analytical lens with insights into the acceptance and adoption of technological innovations. Diffusion of Innovation theory outlines the stages through which individuals adopt new innovations, from early adopters to laggards. Understanding these stages can help identify where the Kudumbashree women in Kerala stand in terms of adopting CB alerts. It aids in tailoring communication and implementation strategies for different adopter categories. The theory also emphasizes the role of communication channels in spreading innovations. Applying diffusion theory can guide the study in identifying effective communication channels to promote awareness and acceptance of CB alerts among this specific community.

TAM considers whether individuals perceive a technology as useful in fulfilling their needs or improving their performance. For the study, TAM can help assess how Kudumbashree women perceive the usefulness of CB alerts in emergency situations. Understanding if they see these alerts as beneficial could predict their acceptance and adoption. TAM also evaluates the perceived ease of using a technology. This aspect can be particularly relevant in understanding how comfortable and convenient the participants feel about receiving and understanding CB alerts. Assessing ease of use could predict the likelihood of adoption among Kudumbashree women.

## **Methodology**

In the pursuit of comprehensively understanding the public perceptions towards Sample Cell Broadcast (CB) alerts of Kudumbashree women in Nilambur, Kerala, the researcher employed quantitative analysis techniques which would systematically capture and interpret the diverse array of perspectives held by the respondents.

The study involved a sample of 32 Kudumbashree women from Kalikavu village in Nilambur, Kerala. Kudumbashree is a community-based women's empowerment programme in Kerala, making this group particularly relevant for understanding community perceptions. The selection of Kudumbashree women as the study's focal point is driven by critical factors aligning with Kerala's unique socio-cultural context and the study's objectives. Their involvement in

vibrant community development initiatives, fostering empowerment and resilience, offers insights into their perceptions and roles in disaster communication. Capturing diverse perspectives from women of varied backgrounds ensures representation and inclusivity. Utilising Kudumbashree's community-based approach aligns with disaster risk reduction principles, shedding light on the effectiveness of Sample CB alerts at the grassroots level. Ultimately, this choice holds practical relevance in informing localized policies and strategies for emergency communication in Kerala.

A random sampling technique was employed to ensure the representation of diverse opinions within the Kudumbashree community in Kalikavu village. A list of eligible participants was obtained from Kudumbashree records, and 32 participants were randomly selected from this list.

The research tool used for data collection was a structured survey questionnaire. The questionnaire was designed to assess the perceptions, awareness, attitudes, and readiness to adopt Sample Cell Broadcast (CB) alerts in emergency situations. The questionnaire comprised of 20 close-ended questions, allowing for quantitative analysis of responses.

Prior permission and cooperation were sought from Kudumbashree authorities (Community Development Societies (CDS), Area Development Society (ADS). Information about the study's objectives, confidentiality, and voluntary participation was provided to the selected participants. The survey questionnaires were distributed among the selected participants during their Kudumbashree meetings and/or at convenient locations in the village. Clear instructions were given regarding how to fill out the questionnaire.

### **Analysis and Findings**

In this section, we will thoroughly examine the data collected and present the findings derived from the study. The analysis encapsulates a meticulous examination of various dimensions, aiming to unveil insights into the reception, effectiveness, and emotional impact of CB alerts among the Kudumbashree women in Kalikavu village of Nilambur Taluk. The study also unfolds a detailed exploration of the perceptions and attitudes of Kudumbashree women towards CB alerts, illuminating their awareness and reliance on this communication tool during crises. Furthermore, we scrutinize the comparative effectiveness of CB alerts concerning the delivery of timely and critical information, assessing its



reliability and speed in contrast to conventional communication channels. Beyond mere effectiveness, we will also delve into the emotional responses and initial impressions triggered by the receipt of CB alerts. This segment unveils the nuances of emotional resonance and the immediate impact on decision-making and response mechanisms during emergency situations.

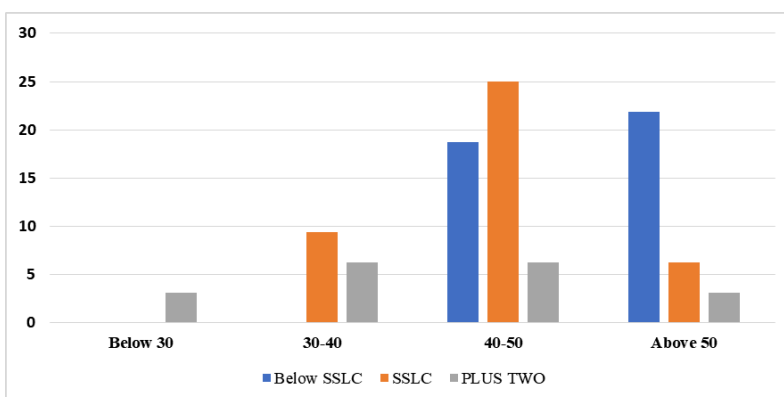
The data analysis is presented and analysed using frequency tables, figures and text. The analysis is based on a sample size of 32 individuals, with a response rate of 75% for the questionnaire.

The table 1 presented here displays the distribution of education levels across different age groups based on the sample data.

Table 1

*Distribution of Education Levels across Age Groups*

Age	Education			Grand Total
	Below SSLC	SSLC	PLUS TWO	
Below 30	0 (0)	0 (0)	1 (3.125)	1
30-40	0 (0)	3 (9.375)	2 (6.25)	5
40-50	6 (18.75)	8 (25)	2 (6.25)	16
Above 50	7 (21.875)	2 (6.25)	1 (3.125)	10
Grand Total	13	13	6	32



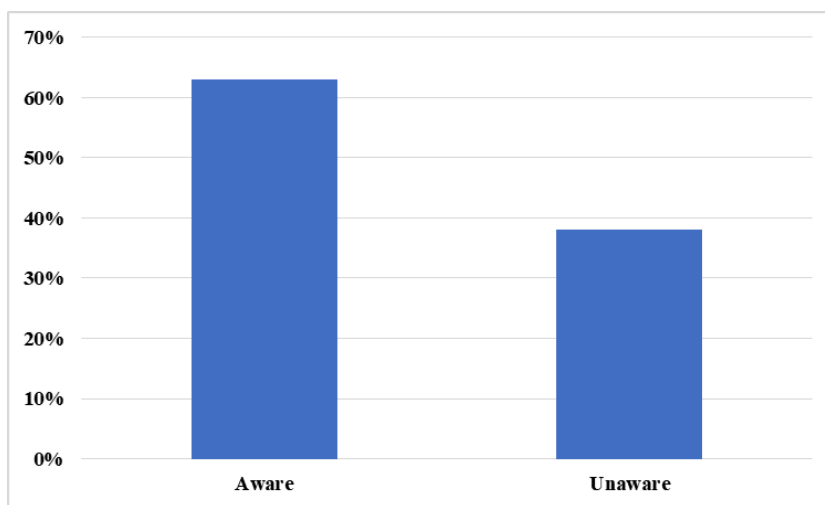
*Figure 2. Distribution of Education levels across Age groups.*

Table 1 provides an understanding of the distribution of education levels (below SSLC, SSLC, and PLUS TWO) among Kudumbashree women categorized into different age groups (below 30, 30-40, 40-50, and above 50 years) involved in the study. The majority of respondents in the sample are in the age group of 40-50 years, followed by those above 50 years, 30-40 years, and below 30 years.

Table 2

*Awareness of Indian government's Disaster Management Efforts Related to CB Alerts*

Awareness of Indian Government's Disaster Management Efforts	Frequency	Percentage (%)
Aware	20	62.5%
Unaware	12	37.5%



*Figure 3. Awareness Level: Indian government's disaster management efforts among surveyed participants.*

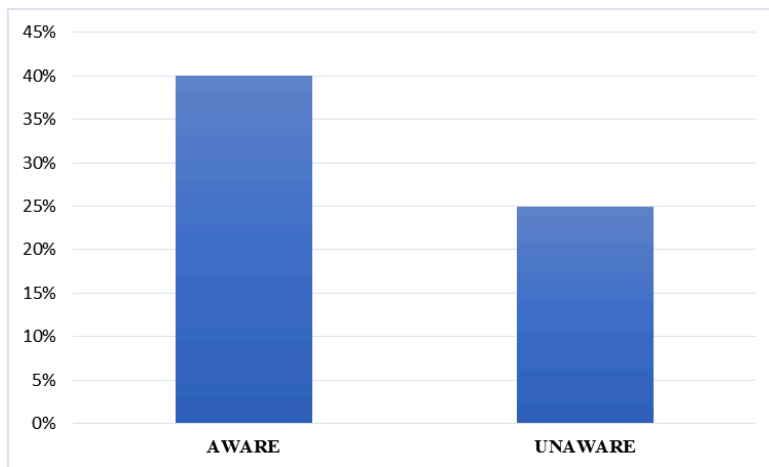
The majority of respondents (62.5%) indicated that they are aware of the Indian Government's disaster management efforts. This suggests a relatively high level of awareness within the sample population. A notable proportion (37.5%) of

participants reported being unaware of the Indian Government's initiatives in disaster management.

Table 3

*Awareness of Cell Broadcast Alerts during Emergencies*

Awareness of Cell Broadcast Alerts for Emergencies	Frequency	Percentage (%)
Yes	11	34%
No	21	66%



*Figure 4. Awareness Level: Cell Broadcast Alerts as a means of receiving emergency information during disasters among surveyed participants.*

According to the data, 34% of respondents reported being aware of cell broadcast alerts for emergencies. This indicates that a minority of participants are familiar with this specific communication method for disseminating emergency information. The majority (66%) of participants indicated that they are not aware of cell broadcast alerts for emergencies. This highlights a significant knowledge gap or lack of exposure to this emergency notification system within the study population. The following table illustrates the reception and impression associated with the sample cell broadcast alerts received by the participants.

Table 4

*Frequency of Sample Cell Broadcast Alerts Received in Different Languages by Respondents*

Language	Frequency	Percentage
Malayalam	5	16%
English	12	38%
Both	7	22%

The majority of respondents (38%) indicated that they received the sample cell broadcast alert in English. Approximately 16% of respondents expressed that they received the alert in Malayalam. About 22% of participants received the alerts in both Malayalam and English languages.

Table 5

*Frequency of First Impressions by the Respondents on Receiving Sample Cell Broadcast Alerts*

First Impression	Frequency	Percentage
Annoyance	1	3%
Curiosity	10	31%
Fear	5	16%
Fear, Curiosity	1	3%
Fear, Shocked	4	13%
Shocked	1	3%
Surprised, Shocked	1	3%

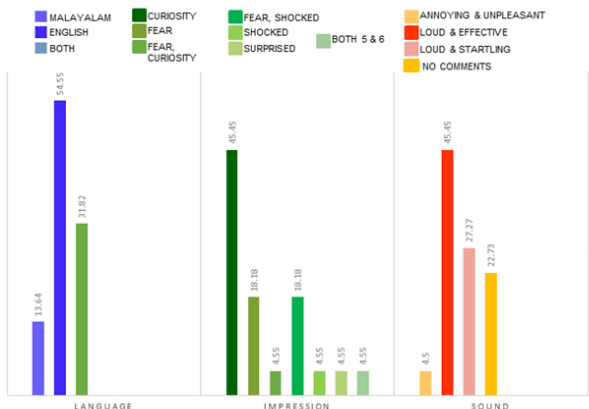
The most common first impression reported by respondents is curiosity, with 31% of individuals expressing interest or intrigue upon receiving the alerts. Approximately 16% of respondents indicated feeling fear upon receiving the alerts. A notable proportion (13%) of respondents reported feeling both fear and shock upon receiving the alerts, indicating a complex emotional response to the content of the messages. Smaller percentages of respondents reported feelings of annoyance (3%), shock (3%), surprise (3%), or a combination of surprise and shock (3%) in response to the received alerts.

Table 6

*Frequency of First Impressions of Alert Sound by the Respondents on Receiving Sample Cell Broadcast Alerts*

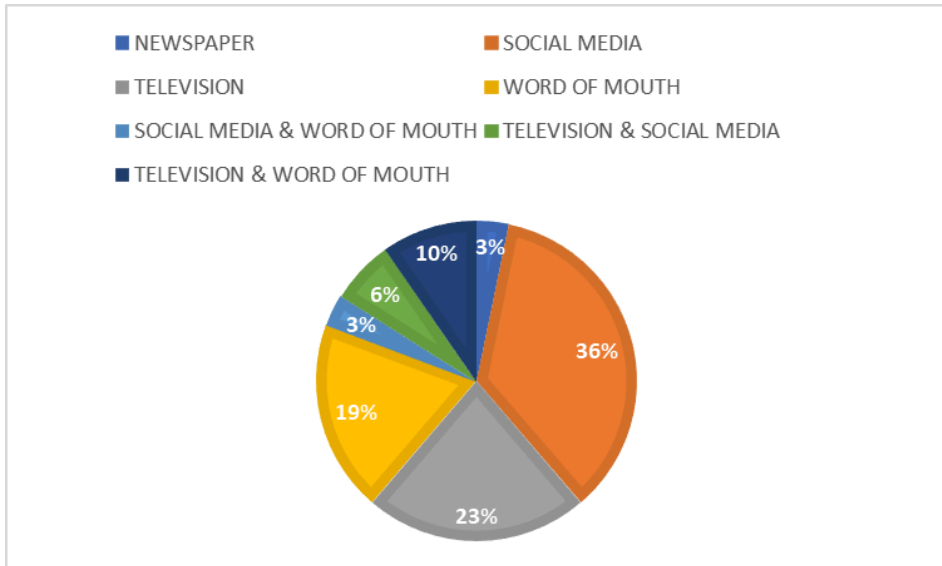
Sound	Number	Frequency
It was annoying and unpleasant	1	3%
It was loud and effective in grabbing my attention	11	34%
It was too loud and startling	7	22%
No comments	5	16%

The majority of respondents (34%) reported that the alert was loud and effective in grabbing their attention. This suggests that a significant portion of the sample found the alert to be impactful and attention-grabbing, which is a positive attribute for emergency notifications. A notable proportion (22%) of respondents expressed that the alert was too loud and startling. This highlights a potential concern regarding the volume and intensity of the alert, which may have led to discomfort or negative reactions among certain individuals. A small percentage (3%) of respondents described the alert as annoying and unpleasant, indicating a negative perception of the sound characteristics of the broadcast. Approximately 16% of respondents did not provide specific comments or feedback regarding the sound of the alert.



*Figure 5. Reception and Impression of sample cell broadcast alerts received by the participants.*

### *Preferred sources of information during emergencies*



*Figure 6. Preferred sources of information during emergencies*

The surveyed participants identified their most relied-upon sources of information during emergencies. According to the data, social media was the primary source, with 34% of respondents relying on it. Television followed closely behind, with 22% of participants turning to TV broadcasts for emergency information.

### *Effectiveness of Cell Broadcast Alerts*

The study also assessed perceptions of cell broadcast alerts for delivering timely and critical information during emergencies. Impressively, 41% of respondents found cell broadcast alerts to be effective in providing crucial updates during crisis situations. Looking ahead, 47% of participants expressed a preference for relying on cell broadcast alerts as a primary source of emergency information in the future.

Table 6

*Cross Tabulation*

Perceived Speed of Cell Broadcast Alerts Compared to Other Information Sources during Emergencies	Primary Source of Information Reliance During Emergencies							Total
	Newspaper	Social media	Television	Word of mouth	Social media, Word of mouth	Television, Social media	Television, Word of mouth	
I don't know	0	0	0	2	0	0	0	2
No, about the same	0	1	0	1	0	1	0	3
No, much slower	0	0	0	0	1	0	0	1
Yes, much faster	1	8	6	2	0	1	3	21
Total	1	9	6	5	1	2	3	27
$\chi^2 = 41.771$ , df - 18, P- value < 0.001								

A cross-tabulation analysis was conducted to examine respondents' opinions on the speed of Cell Broadcast alerts compared to other information sources during emergencies, alongside their primary reliance on various sources of information.

Chi-square tests revealed a significant association ( $p = .001$ ) between reliance on different information sources during emergencies and the perception of Cell Broadcast alerts reaching faster than other sources.

### **Conclusion**

This data underscores the need for targeted awareness campaigns and educational initiatives to further enhance understanding and knowledge about the Government's efforts in disaster management. Strengthening awareness can empower communities to actively engage in disaster preparedness and response activities, thereby contributing to overall disaster resilience.

There are limitations in this study that we need to recognize to grasp the extent of its scope and significance. The study mainly focused on Kudumbasree women, in the Nilambur taluk which could restrict the applicability of the results to categories or regions. Another major drawback of this research pertains to recall bias that may exist among the participants. The precision of

their answers could be influenced by their capacity to remember details or provide an account of their experiences and knowledge.

The findings also emphasize the importance of enhancing awareness and promoting the use of cell broadcast alerts as an effective means of delivering timely and critical information during emergencies. Efforts to educate communities about the availability and benefits of such alert systems can significantly improve overall disaster preparedness and response capabilities. It is also noted that to enhance the effectiveness of cell broadcast alerts, it is crucial to tailor notifications according to language preferences to ensure that emergency information reaches and resonates with diverse segments of the population.

The study also discusses a cross-tabulation analysis performed to investigate respondents' views on the speed of Cell Broadcast alerts versus other information sources during emergencies, in conjunction with their primary reliance on different sources of information. The analysis utilised chi-square tests to explore the relationship between reliance on various information sources during emergencies and the perception that Cell Broadcast alerts reach recipients faster than alternative sources. Results indicated a significant association ( $p = .001$ ) between the reliance on different information sources during emergencies and the perception of Cell Broadcast alerts as being quicker than other sources. This finding suggests that individuals' preferred sources of emergency information may influence their perception of the speed and effectiveness of Cell Broadcast alerts.

In summary our research indicates that there is a level of understanding regarding government disaster management initiatives. There is less awareness of Cell Broadcast alerts among Kudumbasree women. The responses to the alerts varied, reflecting a range of emotions among participants. While many recognized the effectiveness and urgency of Cell Broadcast alerts there was a difference in how they perceived their reliability and speed compared to communication channels. Interestingly individuals who are more active on media tended to view Cell Broadcast alerts as quicker during emergencies. This suggests that Cell Broadcast alerts could become a source of information during crises for those who are actively involved in media platforms. To maximize the effectiveness and reach of Cell Broadcast alerts in situations it is essential to invest in education and promotional activities. By raising awareness and highlighting the advantages of Cell Broadcast alerts we can increase their



adoption and impact ultimately enhancing emergency communication and response capabilities, within the community.

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