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COMMUNICATION BARRIERS IN DISASTER WARNING SYSTEMS: VOICES FROM MARGINALIZED COMMUNITIES IN PAKISTAN

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Abstract
Proper disaster alerts systems are needed in case of minimum risk and loss of lives. However, those who are marginalized are likely to lose attempts to receive, comprehend, or act on such warnings due to social, cultural, and technological factors. This qualitative study explores the problem of communication among vulnerable groups in flood-affected areas of Rajanpur and Badin district of Pakistan. According to the in-depth interviews with 35 local people, NGOs, and disaster management authorities, the research establishes a number of underlying obstacles. These include language exclusion, low literacy levels, limited access to digital technologies, mistrust of official communication of the government, cultural marginalization of women and minorities. Respondents also noted the importance of locally based and trusted communication channels e.g. mosques, elders and radio as better channels of receiving disaster information. In accordance with the Access to Communication Theory and Participatory Communication Theory, the study demonstrates the inability of disaster communication practices to be informed by the daily life of marginalized communities in most instances. Findings have shown that the current systems are majorly top down and technology based thus making them inaccessible to individuals with low levels of literacy or those who do not have access to the internet. The study draws a conclusion that inclusive disaster communication requires localized, culturally suitable and low-technological processes. The early warning outreach can be significantly improved using community-based measures like the use of local language, Girls involvement in preparedness programs, and the utilization of grassroots networks. Communication systems must be socio-culturally adjusted to the socio-cultural background of the populations that they are operating in to be more resilient to a disaster.
Keywords: Disaster communication, early warning systems, disadvantaged communities, Pakistan, participatory communication, language barrier, community-based communication.

INTRODUCTION

The increasing cases of disasters all over the world have underscored the need to have efficient warning systems, particularly in vulnerable regions (UNDRR, 2022). Timely and easy to reach warning communication can significantly reduce the disaster risks and enable the communities to implement protective measures and minimize the loss of lives (IFRC, 2020). However, research continues to show that minority populations such as the poor, minority ethnic groups, women and the disabled are disproportionately affected in terms of receiving, understanding and responding to disaster warnings (Alexander, 2014 and Wisner et al., 2012).

These problems are of special concern to third world countries like Pakistan. Disaster management policies are now better, however, the communication gaps remain, and the poor and vulnerable areas of disaster, such as Rajanpur and

Badin, continue to be shaken by floods that repeatedly disrupted the livelihoods and lives of the people (Rana and Routray, 2018). The barriers of early warning messages within such populations are low literacy rates, language heterogeneity, socio-economic marginalization, and distrust towards government institutions (Mustafa et al., 2015).

The Access to Communication Theory emphasizes the fact that equal disaster preparedness has more than merely to deliver messages; it requires the structural response to inequalities that restrict access or interpretation of crucial information by the members of certain groups (Melkote and Steeves, 2015). Similarly, the Participatory Communication Theory encourages bottom-up communication processes where communities are included to design, provide and evaluate disaster information in a manner that the warnings become actionable and are within their culture (Servaes, 2008).

Past researches underline that technologically advanced warning systems are likely to be inaccessible to the most vulnerable due to infrastructural limitations, language barriers, and socio-cultural forces (Alexander, 2014 and Trogrlić et al., 2022). Despite the efficacy of mobile messages, sirens, and mass media campaigns in urban areas, poor rural populations tend to rely on informal, personal contacts to obtain information, which is not reliable and might be delayed.

In Pakistan, where disaster vulnerability borders linguistic diversity, gender inequalities and geographic remoteness, knowledge of the communication barriers of marginalized populations is important to create effective and inclusive warning systems. There is so far a dearth of empirical evidence on the practical functioning of these barriers or how communication efforts can be effectively streamlined to meet the demands of the people who are at risk.

Communication is the key in cases of disaster prone areas and timely and effective communication can be the only thing between disaster and safety. The prevention of harm and guiding communities to the appropriate reaction is a major key to early warning systems. However, it is only when addressing the marginalized groups, and worse still, rural and underserved areas that these warnings are missed or ignored due to historical social, linguistic, and technological inequality. In Pakistan, floods have been very common in such districts as Rajanpur and Badin, though to most individuals residing in the two areas; disaster alert systems are hindered by structural obstacles in the dynamic conditions of receiving and acting on that alert. The study explores the specific communication barriers that are blocked in the effective delivery of disaster warnings among susceptible individuals in these districts. It tries to steer more specific and inclusive communication strategies that will not leave anyone behind by empowering the most vulnerable.

The research addresses these knowledge gaps by seeking to examine how vulnerable communities in the post-disaster Pakistani flood-prone areas experience disaster warnings. The study examines the inclusiveness of the current communication plans and recommends the relevant and low-cost steps to make the early warning more inclusive and efficient using field interviews with the affected groups, local non-governmental organizations, and district disaster management officials.

Objectives

• To investigate barriers to getting and understanding early warnings by marginalized communities.

To examine the inclusiveness of existing communication plans.

To propose culturally appropriate and low-technology methods of communication.

Research Questions

RQ1: What are the barriers in communication of the marginalized groups in areas prone to disasters?

RQ2: What is the effectiveness of warning messages in various languages and levels of literacy?

RQ3: How disaster communication systems can be improved?

LITERATURE REVIEW

1. Disaster Communication and Early Warning Systems.

The proven functional early warning systems (EWS) are recognized to be the core of disaster risk reduction that provides vulnerable community at risk with timely and actionable information (UNDRR, 2022). The Sendai Framework of Disaster Risk Reduction identifies a need to have people-oriented EWS that is both available, understandable, and accessible to the marginalized groups. (UNDRR, 2015).

Despite technical advancements in disaster-related alertness e.g., mobile traffic, satellite, and mass media communication research reveals that the vulnerable population is likely to be left out of timely warnings due to structural, social, and linguistic factors (Alexander, 2014& Singh, 2022). In the studies, it has been determined that there are challenges faced by the marginalized groups in receiving and acting on disaster warning messages. In the regions with multiple languages, there may be no official alerts in the native language, which limits comprehension (Sukhwani et al., 2022). Less literate populations and particularly women and rural people lack the avenue of written warnings(Wisner et al., 2012; Ahmed, 2019; Muttarak and Pothisiri, 2013). Written warnings cannot be offered to populations with low literacy, in particular, rural settings or women (Wisner et al., 2012; Ahmed, 2019; Muttarak and Pothisiri, 2013). Community members lacking regular access to technology are often left out when relying on technologically enhanced systems of warning, such as cellular phones or internet notifications (Mustafa et al., 2015;

Sutton et al., 2014; Dutt et al., 2019). No trust in the official information source or governmental agencies may lead to the rejection of warnings (Rana & Routray, 2018).No trust in the official source of information or governmental agencies may lead to the rejection of warnings (Wachinger et al., 2013; Vaughan and Seifert, 1992). There are cultural beliefs and gender norms and socio-economic marginalization that limit the reach and effectiveness of disaster communication (Gaillard and Mercer, 2013). Development communication theory can also be applied to the Entry to Communication Theory., which claims that the problem of equal access to information is not merely a technical issue but also a reflection of broader social inequalities (Melkote, 2013). Marginalized groups are also inclined to face structural communication obstacles, including the lack of official access to information, lack of specialised messages, and it is less likely to be involved in opportunities to participate in the decision-making (Servaes, 2008). Studies finds a lot of disaster cases, disparities in access to communications increase vulnerability, as less powerful groups stand a lower chance of being prepared, responding in the right manner, and recovering in the aftermath of a disaster (Alexander, 2014).

Participatory Communication Theory advocates participatory and dialogical approaches to community involvement in the process of disaster communication planning, implementation, and evaluation (Servaes, 2008). It is empirically proven that warnings are the easiest to accept when they are based on local knowledge, use familiar communication channels, and the participants in the warning are the members of the community that is trusted locally (Gaillard and Mercer, 2013; Singh, 2022). The participatory approach was identified to enhance the risk perception, the level of trust in warning messages, and the ability of the vulnerable population to respond in a protective way (Shaw et al., 2013; IFRC, 2020).

Although there is a global consensus and literature that emphasizes the role of inclusive disaster communication, the empirical evidence in Pakistan is rather sparse, particularly in terms of the reality of marginalized groups in disaster communication aspects, particularly warning reception and understanding. The majority of studies focus on the technical infrastructure or top-down institutional solutions, and fewer studies are made to comprehend the role of cultural, linguistic, and socio-economic limitations in improving the performance of the warning systems in rural flood-prone regions (Mustafa et al., 2015; Rana and Routray, 2018). This study satisfies this gap by exploring barriers to communication in early warning systems using the language of the marginalized communities in Pakistan and asking culturally relevant, low- technology questions on how to make these more accepting.

THEORETICAL FRAMEWORK

Disaster early warning systems are efficient not only on the nature of technological infrastructures, but on the inclusiveness and accessibility of communication procedures. This study uses two theoretical frameworks that are complementary to each other Access to Communication Theory and Participatory Communication Theory to study the communication barriers to disaster warnings in Pakistan among marginalized populations. Access to Communication Theory, which is established in development communication literature, highlights the fact that the access to information is unequal in itself and mediated by the more significant socio-economic, cultural, and political systems (Melkote, 2013; Servaes, 2008). In the case of disaster communication, this theory purports that the vulnerable populations are prone to victimization by the systemic divides which deprives them of the ability to receive, understand, or act on early warning. Such barriers may include: Linguistic exclusion through a warning using foreign languages, technological limitation in areas whose infrastructure is not reliable, social exclusion, in which women, ethnic minorities or disabled people are excluded in institutional communications and poor trust in government-driven warning facilities. All these are means of restricting fair access to life-saving information, continuing to put vulnerable populations at a disadvantage (Alexander, 2014; Wisner et al., 2012). In the case of disaster prone regions in Pakistan, the Access to Communication Theory can be used to examine how the poor communities in the specific and far-flung regions with linguistic diversity and economic deprivation are progressively being disenfranchised out of effective warning systems.

Meanwhile, Participatory Communication Theory leads to the peri-encircling of fair access to life-promoting information, which is perpetuating exposure to the exposed groups (Alexander, 2014; Wisner et al., 2012). In the case of the disaster-impacted areas in Pakistan, the theory of the Access to Communication can be applied in research on how the poor communities, particularly those in remote, linguistically ghettoes, and economically poor areas, become systematically marginalized in the effective warning systems Using this theory, the study examines the extent to which the current warning systems against disasters in Pakistan incorporate marginalized communities during the design of communication messages, dissemination, and feedbacks. This work explores with the intersection of the theories of Access to Communication and Participatory Communication. The rationale behind the approach of the study to analyze the communication deficits is this combined approach, and it guides the development of the recommendations concerning low-tech, culturally-specific communication tactics that respond to marginalized populations in Pakistan.

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METHODOLOGY

1. Research Design

The present study adopted a qualitative descriptive design to investigate the issue of communication barriers in disaster warning systems among the marginalized communities in Pakistan. The study was done in flood-prone areas of Rajanpur (Punjab province) and Badin (Sindh province). Such districts were chosen because they experience frequent exposure to floods, the existence of significant socio-economic susceptibility, linguistic heterogeneity, and the existence of marginalized groups, such as ethnic minorities, female headed families, and low literate individuals. The purposive sampling strategy was used so that the various views especially the marginalized groups were represented. The community respondents were chosen according to the following criteria:

- Living in flood-afflicted, remote or underserved regions.
- Membership in socially or economically disadvantaged groups (e.g. ethnic minorities, women, low-income households).
- Prior experience of flooding events and experience of warning systems.

The final sample for this research is included 25 members of the community (15 badin, 10 rajanpur) and 6 NGO representatives (3 each district) The participation of all participants in semi-structured interviews was carried out in the local languages (Saraiki, Sindhi, Urdu) to create a level of understanding and comfort. Interviews took 30 - 45 minutes and were recorded with consent. Thematic analysis method was used to establish the major trends and themes in the qualitative data (Braun and Clarke, 2006).

Findings and Thematic Analysis

Table 1 *Collective Summary of Key Findings on Communication Barriers in Disaster Warning Systems*

Theme	Barrier or Insight	Frequency (Participants Reporting)
Language Barriers	Warnings not delivered in local languages (Saraiki, Sindhi)	20
Low Literacy and Message Comprehension	Written warnings inaccessible to low-literacy populations	18
Technology Access Gaps	Mobile alerts ineffective due to network or device gaps	16
Trust Deficits in Authorities	Distrust in government messaging limits compliance	15
Cultural Exclusion of Women and Minorities	Gender norms and social exclusion restrict access to information	14
Value of Community-Based Communication	Local leaders, mosques, and interpersonal networks seen as reliable sources	22

Thematic analysis of 25 community interviews, 6 NGO representatives, and 4 disaster management officials identified common barriers to communication that undermine the effectiveness of the disaster early warning system to marginalized communities in Pakistan prone to floods disaster. The themes uphold the structural, linguistic, socio-cultural and technological issues that overlap to limit equal access to life saving information.

1. Language Barriers

One of the strongest themes that were observed is the absence of localized language use in warnings of the disaster. The same respondents, of Rajanpur and Badin, indicated that the official warnings were mostly issued in Urdu or English, neither of which had much currency with the rural and low-literate masses. The alert was in Urdu through TV but in our village, the majority of the population speaks Saraiki. A lot of people did not know what it was. This observation corresponds to the Access to Communication Theory, which highlights the systematic marginalization of vulnerable groups in access to vital information by the linguistic exclusion system (Melkote, 2013).

2. Poor Literacy and Interpretation of Messages.

Poor literacy also complicated the communication. Illiterate people, especially those who are older and women, could not get such written warnings, posters, or SMS alerts. I got a text message, and I am not able to read. I needed to inquire my son on what happened to be the case (Female participant, Badin). The participants showed that they wanted visual symbols, oral announcements, or radio based warnings that would suit the illiterate population, which underscores the relevance of culturally relevant modes of communication (Servaes, 2008).

3. Technology Access Gaps

There was a rich amount of technological constraints mostly in remote villages with poor mobile connection, power supply or digital gadgets. We were told that the mobile sent warnings, but lots of families in this area do not have phones or even a signal. These disjunctions reveal the ways in which the high-tech warning systems do not tend to

reach marginalized communities, which are consistent with the findings on the inequality of disaster communication globally (Singh et al., 2021).

4. Mistrust towards Authorities.

One of the weaknesses was a lack of trust towards official warning sources. Other participants have viewed the government messages to be unreliable or political in nature, which led to slower responses or ignoring the warnings. They say there is a flood, sometimes, but nothing happens. So people would cease believing them. This highlights how trust-building is instrumental in effective disaster communication as incorporated by the Participatory Communication Theory that points to the importance of engaging communities in message development and conveyance (Gaillard and Mercer, 2013).

5. Women and Minorities Cultural Exclusion.

Social exclusion and gender norm restricted access to warnings in women and minority groups:In our village, men are the only ones to attend the meetings where warnings are addressed. Women are not made to be aware. This cultural obstacle confirms the literature that disaster communication plans do not consider the special needs of the minority population, which increases their susceptibility (Wisner et al., 2012).

6. Merit of Community-Based Communication.

Nevertheless, the participants stressed the effectiveness of trusted and community-based sources of information: We look up to the mosque loudspeaker or the village leader to inform us what is going on. (Community member, Badin). Religious institutions, interpersonal networks, and local leaders were also mentioned as credible sources of information in time. Such an observation justifies the need to apply low-tech, participatory strategies that can involve communities in the process of disaster preparedness (Servaes, 2008; Singh et al., 2021). The research indicates that language barriers, literacy, technological disparities, lack of trust, and cultural exclusion are all contributing factors to inaccessibility and ineffectiveness of the disaster warning systems to the marginalized groups in Pakistan. The socio-cultural and infrastructural contexts of vulnerable populations and the community preferences to local, oral, and trusted information sources imply the necessity to modify communication goals to the latter. These results are in line with the Access to Communication Theory, which reveals structural communication inequalities, and the Participatory Communication Theory, which focuses on participatory and community-based approaches to risk communication.

FINDINGS AND DISCUSSION

Linguistic Disparity and Isolation.

The language barriers have been cited as a significant problem that has been recurrently influencing the communication in the event of a disaster in this situation. The challenges that have been commonly experienced by participants in different flood prone districts were described in detail. To this extent we can refer to some of the districts such as Rajanpur and Badin. Such individuals were always relaying that warning messages and early alerts were only aired in one of the two languages (Urdu and English). We would observe that these are not necessarily the languages that the local people would be conversant with. In this case, we should mention languages used by people in these societies, e.g., Saraiki, Sindhi, Balochi, and other dialects. As a result, a great number of individuals could not comprehend these messages at all or had to find a person who could explain them to him in such a way, the period of time to actually accomplish the actions was significantly bigger and the risk of becoming a victim of the disaster even grew. It is a literal contravention of the principle of inclusive and approachable language, especially, the contravention of the principle of communication in life-threatening emergencies when time is of the essence. Pakistan is not the only country where this linguistic marginalization is practiced. Other multilingual and ethnically diverse locations around the world have also been found to have such results. As an illustration, when the Indian Ocean tsunami occurred in 2004, most of the coastal populations in Indonesia and Thailand were not issued with adequate warnings despite being life saving messages since the messages were not expressed in their languages and hence many were killed in vain. (Shaw et al., 2013). Findings in the U.S. prove that the Spanish-speaking population has been disproportionately impacted in times of natural calamities and English-only warnings contributed significantly to such a situation (Arze et al., 2020). Moreover, in the case of the Cyclone Nargis, and when Myarmar was being hit, affected people not in local dialects were not given the right words to be able to evacuate and, therefore, many lives were lost Linguistic discrimination in accessing technology is a direct consequence of structural inequalities in the communicating systems. Such is the central concept of the Access to Communication Theory (Melkote, 2013). Under the theory, communication becomes not a technical flow of information but a process within the society where the marginalized communities tend to be deficient in access that is meaningful. In the case of failure of the disaster communication systems to adequately interact with the indigenous and minority communities in their own languages, then it means that the same structure of oppression is perpetuated and therefore the indigenous and minority groups are not only vulnerable but also not under the protection of the early warning infrastructures. The importance of linguistically inclusive communication as one of the key elements of effective disaster risk reduction has been emphasized by recent research. As Akhter et al. (2021) note, the locally transcribed and ecologically adjusted warnings are much more effective in terms of understanding, building confidence, and taking immediate action. Additionally,

the Sendai Framework on Disaster Risk Reduction 20152030 stipulates the delivery of multi-hazard and multi-lingual early warning mechanisms with personal orientation as one of the essential requirements to meeting the universal access condition (UNDRR, 2015). Besides this, the flow of information has been eased by use of community oriented communication means like local radio stations and voice messages by the elders who are trusted and relay the information in the native language. Nepal and Philippines are among the countries that have supported this (Gaillard and Gomez, 2015). The mentioned cases suggest that the issue of language barriers is not merely a technical problem, but the principle of fair and just governance of disasters.

Reading and Understanding the Message.

The low literacy rates in remote and marginalized communities affect the efficiency of disaster communication to an enormous negative degree such that the absence of its effectiveness is practically inevitable. The participants interviewed in Rajanpur and Badin asserted that they could not comprehend the disaster warnings that were sent to them via SMS message alerts, posters, pamphlets, or printed notices very frequently. These channels of communication rely on reading and writing capabilities that the members of the community particularly the older adults and women lack. The lack of correlation between the mode of how the message is delivered and the mode through which the message is received portrays an extremely critical drawback in the current designs of early warning systems.

To be more precise, the Pakistani women residing in rural areas are mostly in the context of educational deprivation, which results in a structural obstacle to illiteracy and, by extension, inability to obtain the information about the risks. The elderly are mainly the people who have never been to school and they are very dependent on other people to make them comprehend the text-based warnings. Under these circumstances, the important messages are many times not heeded not because they are being lazy or ignorant but because the communication formats are such that they fail to appreciate the fact that the greatest segments of the population exist. Such findings support the global disaster risk reduction (DRR) literature, particularly in those regions as South Asia, Sub-Saharan Africa, and Southeast Asia, where illiteracy has been mentioned numerous times as the obstacle to the effectiveness of the early warning systems (Gaillard and Mercer, 2013; Alexander, 2014). For instance, in

Nepal countryside and Bangladesh, cyclone or landslide warnings are often sent to vulnerable populations lacking simple literacy skills, through which they can read these warnings (Rahman et al., 2021). A highly analogous issue has been presented in Mozambique where flood warnings on paper have been rendered ineffective because low-income rural dwellers are illiterate without receiving an education (Jones et al., 2023).

The application of written warnings under such circumstances is certainly not consistent with the people-focused approach to disaster communications which is inclusive that are promoted internationally according to the Sustainable Development Goals. Other advocates of participatory communication like Servaes (2008) point out that the visual, oral and auditory forms of communication including pictographs, loudspeakers, community radio and interpersonal networks are not substitutes but instead they form the requisite communication tools to the populations that are low literate. Through these channels understanding, memorization and action even in case of absence of reading abilities are achievable. The most prominent global disaster risk reduction agenda is the Sendai Framework of Disaster Risk Reduction (20152030), which acknowledges the need to address the concern of ensuring that risk information is made easy to understand, practical, and use by all interested parties, including those with low literacy, disability, or language underprivileges (UNDRR, 2015). This practically implies that the INTERREG Nano depositories can contact the entire community in a multi-tiered manner with an array of varying ways like voice messages in cellular phones using local dialects, outreach in the community using people who are trusted and visual signage using universal signs particularly during emergencies of high-stakes, like floods or earthquakes. Speaking of which, the models of participatory communication espouse the idea that communities must not be perceived as passive consumers of information, but as active participants in the process of messages creation and distribution. This amalgamation of local knowledge systems, oral storytelling traditions, and community theatres has succeeded in such countries as the Philippines and Indonesia where a complex system of social and cultural and literacy is addressed through bottom-up engagement strategies (Lassa et al., 2019; Gaillard and Gomez, 2015).

Addressing the problem of illiteracy in the communication of a disaster is definitely a domain that brings the equity and justice concerns and the accessibility one. In cases where the goal of the early warning systems is to save every life, then the most at risk individuals which in most cases are because of illiteracy must be the subject of the design of communication. This is actually the only means through which the warning systems can be humanized and lives saved.

Structural Limitations and Technology Access.

The area of early warning systems and crisis communication has changed due to the usage of digital technologies, particularly in urban and semi-urban areas. Nevertheless, the effect of their effectiveness is highly influenced when they are applied in marginalized areas in the countryside. The case in Pakistan is that situation that is seeing the increased reliance on mobile notifications, SMS notifications and internet-based systems to communicate disasters is inclined to ignore the fact that the under-resourced regions are technologically different. Other participants in far-flung areas such as Rajanpur and Badin drew a sketch of very little or none at all of access to smartphones, low or low coverage in mobile networks and frequent power cuts that leave them unable to get vital signals in time. Most are the

times when despite the fact that some messages may be sent out over a period, there are infrastructural loopholes such that messages were delivered long after they were sent or they were not delivered at all. The digital divide is not exclusively the capability to have the access to the devices it is also representative of the social and economic difference so extensive that it deprives the most vulnerable ones of life-saving information. In these low income households, phone sharing is common with the different members of the family or the phone is used by the male earners exclusively and therefore women and the elderly may not get chances to get time sensitive alerts even when it is the smallest among the alerts. Conversely, mobile-based warnings often take the assumption that the recipients will be literate; it will be the worst case to the people who cannot read or use the digital interfaces.

These challenges are the result of local inefficiency of global technocratic disaster risk reduction (DRR) models that focuses entirely on the technical solutions only e.g. application, SMS messages, etc., and has no idea about the community realities and capabilities (Singh et al., 2021; Kelman, 2024). In this regard, in addition, such strategies would even prioritize the focus on the high-tech infrastructure and innovations, disregarding the local, grassroots systems. The fact that such solutions are not supposed to occur but when they do occur they may be used to make the most vulnerable to the changes in the climate situation even more vulnerable rather than assisting them become much tougher. Technology Appropriation Theory, as well as participatory development literature, takes that into consideration so that the technology to be utilized should be adapted in such a manner that it can suit the local needs, capabilities, and cultural context (Fuad et al., 2006; Tacchi et al., 2003). Conversely, inclusion, inefficiencies and mistrust are often caused by the top-down impositions of technology. The absence of the assurance of inclusive technological access in the process of communication during the event of disasters compromises the aspect of fair risk-reduction. The Sendai Framework of Disaster Risk Reduction (20152030) also writes that, low costs early warning systems should be available, customized, and comprehensible to everyone especially those ones located in remote areas and less resourceful (UNDRR, 2015). In practice, the digital systems are not allegedly to be isolated of the low-tech, community-based approaches. They are the mosque announcements, megahones, radio communications and trusted intermediaries that can relay the alerts orally that is why it is mentioned that instanced warning systems which combine SMS alerts with offline community-based speakers, visual flags, and town crier systems have had more successful outcomes especially in rural and coastal regions (Le Dé et al., 2018; Lassa et al., 2019). Not only are these more inclusive, but also more resilient to infrastructure failures during the occurrence of a disaster.

Concisely, unless equitable investments are made in equitable access and inclusive communication modalities, the growth of digital early warning systems will contribute to the strengthening of structural exclusion. Disaster resilience is not a technology only endeavor it has to be developed together with the communities that it is meant to safeguard.

Deficits of Trust and Institutional Disconnection.

The lack of trust on disaster warnings issued by the government was one of the essential barriers to effective risk information transfer and immediate response among the population. When districts of the flood prone Salam, Badin and Rajanpur issued warnings to most of its people, many dozens responded to them, as most of them had never received these kinds of warnings before and had fallen prey to misinformation, belated instructions and unfulfilled promises of rescue. It was the cases, especially that were recalled and taken into account by residents, of warnings which were too late, or false alarms, causing unnecessary precaution or disturbance in others, or occasioning complacency. Warns that the main principles of the Seneca philosophy are Stoic. According to him, the only good is virtue. He is proposing that we can train ourselves to virtue, rationality and learn self-control by being unreasonable and immature willingly. Behave according to the reason and ways of Nature. A significant part of his teachings is oriented to the peace of mind and resilience to the ill fortune (Alexander, 2014; Wisner et al., 2012). In these situations, technically correct and timely warning can be disregarded when provided by actors who are viewed as being bureaucratically remote or politically unaccountable. The issue has been reported in both the Hurricane Katrina response in the United States to warnings about cyclones in Bangladesh and the control of drought in Sub-Saharan Africa (Patt and Gwata, 2002; Lejano et al., 2016).

In theory, the Participatory Communication Theory holds an important part as far as how trust may be built. According to the theory, top-down, and one-way flow of information is inadequate particularly in crisis cases when the level of urgency is high and the level of institutional credibility is low. It must be dialogic, participatory and embedded communication (Servaes, 2008). Issuing early warnings is not the only way of generating trust, but because communities are consulted, trained, and received feedbacks and preparedness plans are prepared together will also build trust.

Moreover, credibility of messages has also been found to be improved through the use of familiar and trusted local contacts such as teachers, religious leaders, union leaders or health workers. As an example, in Indonesia and the Philippines, residents were willing to respond to evacuation requests given by local officials than the same request given by distant officials or SMS (Le Dé et al., 2018; Gaillard and Texier, 2010). These trusted actors act as a mediator between the formal organizations and the citizens, decoding the message about risks in socially and culturally meaningful ways.

The Sendai Framework (UNDRR, 2015) also gives importance to developing a sense of trust by creating people-centered early warning mechanisms that are open, community focused, and where the community participates. The

most effective warning mechanisms cannot work on the ultimate and most crucial step, which is public compliance, without trust.

This will not be just a matter of technical improvement in disaster communication in Pakistan though. It requires frequent, transparent communication, responsibility of past follies and most importantly, personal participation in local communities. Through citizens participation in the planning and development of early warning systems and listening to their knowledge, experiences, and agency disaster authorities can make a start in overcoming the deficit in trust that currently hinders appropriate preparedness and response.

Gender and Social Exclusion

The analysis found that there are deep rooted gender and social disparities that are powerful factors that determine access to disaster information in rural communities such as Rajanpur and Badin. The barriers to accessing formal warnings of disasters and early alerts were found to be the patriarchal systems and cultural norms of restricting women. Women in both districts reported that they were actively locked out of village-level platforms where disaster preparedness was being discussed, had little access to the local governance systems or media outlets, and habitually depended on the male family members husbands, sons, or brothers to relay important information to them. This second access not only reduced the speed of conveying the essential information, but also made it possible to distort or underestimate the risks that are being conveyed.

Similarly, ethnic minority groups (e.g., marginalized tribes), and low-caste communities in these districts complained that they were institutionally excluded in formal communication systems. The participants cited language barriers, distance and lack of trust in the governmental avenues as reasons as to why they are often left behind in mainstream disaster communication. Such groups were most frequently forced to resort to informal sources word of mouth, community leaders or NGO field agents in order to know the information which was not always reliable and up-to-date.

The local results support a general body of evidence on the international level indicating that gender, ethnicity, caste, and disability are essential factors in accessing communication in emergency situations. Studies in Asia, Africa, and Latin America have continuously identified disproportionate impediments to disaster warnings receipt, interpretation, and reaction in women, minorities, and individuals with disabilities (Gaillard and Mercer, 2013; Bradshaw and Fordham, 2015). These imbalances are not sporadic but a product of structural marginalization of socio-cultural stratifications and institutionalities. Using the case of Indian Ocean tsunami which happened in 2004, it was found that women in different countries were most affected since they did not receive early warnings or rather had no freedom to act in response to the tsunami (Ariyabandu, 2005).

This need is being recognized more by international mechanisms. The Sendai Framework of Disaster Risk Reduction (20152030) specifically encourages the empowerment of women and other at risk groups in disaster risk management. It highlights that an all-of-society approach with engagement and partnership must be utilized in order to support people with disasters (the poor, the elderly, persons with disabilities, and the indigenous people) to have access to the information equally (UNDRR, 2015).

This would practically entail the planning of early warning systems which

- Use gender sensitive delivery channels and language.
- Involve women and minority in disaster committees.
- Use culturally acceptable outreach through female health workers, women councils and local languages broadcast.
- Enhance privacy and security in warning the women in conservative households.

Without such specific programs, disaster communication will perpetuate existing social stratifications such that the neediest are numerically and operationally invisible.

A Solution based on Community-based Communication.

Despite the presence of institutional challenges such as language exclusion, low literacy, technological un-accessibility, and institutional mistrust, the study found a great need to rely on community-based communication channels as the most vital sources of information during disaster times. The respondents of both Rajanpur and Badin were in agreement that information disseminated through mosque loudspeakers, local religious leaders, village leaders, and informal interpersonal communication like family members, neighbors, and friends is what they depended on in cases of emergencies and acted upon. These platforms were viewed as familiar, culturally fit, and easily accessible especially to the people who do not have access to digital technologies or the official media.

The Mosque loudspeakers, e.g. were found to be one of the primary ways of delivering urgent messages due to their wide geographical outreach, credibility and ability to overcome literacy and language barriers. The value of moral weight, localized presence, and perceived concern with the welfare of people were also characteristics that earned value to the religious leaders and elders. These localized actors provide plausible and opportune, in-situ communication that attracts communal reaction, which is reflective of global disaster risk reduction (DRR) literature to encourage decentralized and participatory communication practices. South and Southeast Asia, Latin America, Sub-Saharan Africa have evidence that peer-embedded networks are more efficient than top-down systems in terms of penetrating a message and generating trustworthiness (Gaillard and Mercer, 2013; Le Dé et al., 2018). In Indonesia,

rural areas especially, the compliance of warnings announced by the mosques or by the village meetings was significantly higher than that of the SMS messages, which were sent by the government (Lassa et al., 2019).

This culturalized shift in communication is in line with Communication for Social Change theory that believes in two-way communication, local responsibility, and culturally-relevant communication instead of universal ones (Servaes, 2008; Dagron, 2009). Community-based media do not constitute information pipes, but rather social capital networks that reflect and support local values, collective memory, and systems of trust. Notably, such localized communication channels can offer redundancy and resiliency to the infrastructure when it suffers a breakdown like the loss of a mobile network or power cuts or road blocks. Even in the case of a failure in the digital systems, community loudspeakers, manual warning signs (e.g., flags, or drums) and word-of-mouth chains also can be effective. Therefore, integrating these systems into official disaster communication strategies does not only expand the potential reach but also increases reliability.

Lastly, the community-based channels of communication need not be placed as emergency back-up plans, but rather as part of the national early warning systems. The policymakers and disaster management authorities must do their best to institutionalize partnership with religious bodies, local authorities, and grassroots networks in co-designing inclusive, trusted, and responsive communication arrangements that resonate with lived realities of communities to which they are being served.

CONCLUSION

The study examined the communication barriers among displaced populations in areas probable to flood in Pakistan and established that both access and being an inclusive system to access warning systems during disasters are severely restricted. Despite the availability of early warning systems, structural inequalities with their origins in the marginalization of language, literacy inequalities, technological restrictions, social mistrust, and cultural marginalization still restrict access to life-saving knowledge.

The study establishes that top-down warning measures that are based on technology are likely to disregard the infrastructural and socio-cultural conditions of the vulnerable populations. Based on the theories of Access to Communication Theory and Participatory Communication Theory, the given research defines the necessity to reinvent the process of disaster communication as the community-based and rights-based one. Reducing such hindrances involves institutional adjustments and in-country level interventions to enable everyone in the society and particularly the poor to be in a position to get, comprehend, and act upon disaster warnings.

REFERENCES

1. Alexander, D. E. (2014). Social media in disaster risk reduction and crisis management. *Science and engineering ethics*, *20*(3), 717-733.
2. Arze, S., Lagos, C., Ibacache, M., Zamora, M., & González, A. (2020). Incidence and risk factors of preoperative anxiety in Spanish-speaking children living in a Spanish-speaking country. *Pediatric Anesthesia*, *30*(7), 792-798.
3. Akhter, W., Zaman, K., Nassani, A. A., & Abro, M. M. Q. (2020). Nexus between natural and technical disaster shocks, resource depletion and growth-specific factors: evidence from quantile regression. *Natural Hazards*, *104*(1), 143-169.
4. Assembly, U. G. (2015). The Sendai framework for disaster risk reduction 2015–2030. *UN General Assembly: Geneva, Switzerland*.
5. Ariyabandu, M. M. (2005). *Gender dimensions in disaster management: A guide for South Asia*. Zubaan.
6. Ahmed, I. (2019). The national plan for disaster management of Bangladesh: Gap between production and promulgation. *International Journal of Disaster Risk Reduction*, *37*, 101179.
7. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.
8. Bradshaw, S., & Fordham, M. (2015). Double disaster: Disaster through a gender lens. In *Hazards, risks, and disasters in society* (pp. 233-251). Academic Press.
9. Creswell J. W., Poth C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage.
10. Dagron, A. G. (2009). Playing with fire: power, participation, and communication for development. *Development in practice*, *19*(4-5), 453-465.
11. Dutt, R., Basu, M., Ghosh, K., & Ghosh, S. (2019). Utilizing microblogs for assisting post-disaster relief operations via matching resource needs and availabilities. *Information Processing & Management*, *56*(5), 1680-1697.
12. Enarson, E. P. (2012). *Women confronting natural disaster: From vulnerability to resilience* (p. 245). Boulder, CO: Lynne Rienner Publishers.

13. Fuad, A., Kusnanto, H., Utarini, A., Dijk, J. V., & Groothoff, J. W. (2006). The use of geographic information systems (GIS) for rapid assessment of health facilities following a disaster: the case of the tsunami disaster in the province of Aceh. *APAMI 2006*.
14. Gaillard, J. C., Wisner, B., Benouar, D., Cannon, T., Creton-Cazanave, L., Dekens, J., ... & Vallette, C. (2010). Alternatives for sustained disaster risk reduction. *Human Geography*, *3*(1), 66-88.
15. Gaillard, J. C., & Gomez, C. (2015). Post-disaster research: Is there gold worth the rush?: Opinion paper. *Jàmbá: Journal of Disaster Risk Studies*, *7*(1), 1-6.
16. Gaillard, J. C., & Mercer, J. (2013). From knowledge to action: Bridging gaps in disaster risk reduction. *Progress in human geography*, *37*(1), 93-114.
17. International Federation of Red Cross and Red Crescent Societies. (2020). *World Disasters Report 2020: Come Heat or High Water: Tackling the Humanitarian Impacts of the Climate Crisis Together*. International Federation of Red Cross and Red Crescent Societies. https://www.ifrc.org/document/world-disasters-report-2020
18. Jones, R. L., Kharb, A., & Tubeuf, S. (2023). The untold story of missing data in disaster research: a systematic review of the empirical literature utilising the Emergency Events Database (EM-DAT). *Environmental Research Letters*, *18*(10), 103006.
19. Krüger, M., & Albris, K. (2021). Resilience unwanted: Between control and cooperation in disaster response. *Security dialogue*, *52*(4), 343-360.
20. Kelman, I. (2024). Choosing or avoiding disaster. *Geography*, *109*(1), 36-39.
21. Le Dé, L., Rey, T., Leone, F., & Gilbert, D. (2018). Sustainable livelihoods and effectiveness of disaster responses: a case study of tropical cyclone Pam in Vanuatu. *Natural hazards*, *91*(3), 1203-1221.
22. Lejano, R. P., Casas Jr, E. V., Montes, R. B., & Lengwa, L. P. (2018). Weather, climate, and narrative: a relational model for democratizing risk communication. *Weather, climate, and society*, *10*(3), 579-594.
23. Moustafa, K. (2015). The disaster of the impact factor. *Science and engineering ethics*, *21*(1), 139-142.
24. Mustafa, D., Gioli, G., Qazi, S., Waraich, R., Rehman, A., & Zahoor, R. (2015). Gendering flood early warning systems: the case of Pakistan. *Environmental Hazards*, *14*(4), 312-328.
25. Melkote, S. R., & Steeves, H. L. (2015). Communication for development: Theory and practice for empowerment and social justice.
26. Muttarak, R., & Pothisiri, W. (2013). The role of education on disaster preparedness: case study of 2012 Indian Ocean earthquakes on Thailand's Andaman Coast. *Ecology and Society*, *18*(4).
27. Moges, M. A. (2013). A study on how disaster issues reported on the Ethiopian print media. *Online Journal of Communication and Media Technologies*, *3*(4).
28. Patt, A. G., & Schröter, D. (2008). Perceptions of climate risk in Mozambique: implications for the success of adaptation strategies. *Global environmental change*, *18*(3), 458-467.
29. Rana, I. A., & Routray, J. K. (2018). Multidimensional model for vulnerability assessment of urban flooding: An empirical study in Pakistan. *International Journal of disaster risk Science*, *9*(3), 359-375.
30. Rahman, M. M., Bodrud-Doza, M., Shammi, M., Islam, A. R. M. T., & Khan, A. S. M. (2021). COVID-19 pandemic, dengue epidemic, and climate change vulnerability in Bangladesh: Scenario assessment for strategic management and policy implications. *Environmental research*, *192*, 110303.
31. Rana, I. A., & Routray, J. K. (2018). Multidimensional model for vulnerability assessment of urban flooding: An empirical study in Pakistan. *International Journal of disaster risk Science*, *9*(3), 359-375.
32. Servaes, J. (2008). Communication for development approaches of some governmental and non-governmental agencies. In *Communication for development and social change* (pp. 201-218). SAGE Publications India Pvt Ltd.
33. Šakić Trogrlić, R., Van Den Homberg, M., Budimir, M., McQuistan, C., Sneddon, A., & Golding, B. (2022). Early warning systems and their role in disaster risk reduction. In *Towards the "perfect" weather warning: bridging disciplinary gaps through partnership and communication* (pp. 11-46). Cham: Springer International Publishing.
34. Singh, M. K. (2022). Information Technology in Disaster Management. *Saudi J Eng Technol*, *7*(6), 312-315.
35. Sukhwani, V., Gyamfi, B. A., Zhang, R., AlHinai, A. M., & Shaw, R. (2019). Understanding the barriers restraining effective operation of flood early warning systems. *International Journal of Disaster Risk Management*, *1*(2), 1-19.
36. Servaes, J. (Ed.). (2020). *Handbook of communication for development and social change* (Vol. 1). Singapore: Springer.
37. Shaw, R. (2013). Disaster risk reduction and community approaches. In *Community practices for disaster risk reduction in Japan* (pp. 3-20). Tokyo: Springer Japan.
38. Servaes, J. (Ed.). (2020). *Handbook of communication for development and social change* (Vol. 1). Singapore: Springer.
39. Servaes, J. (2008). Communication for development approaches of some governmental and non-governmental agencies. In *Communication for development and social change* (pp. 201-218). SAGE Publications India Pvt Ltd.
40. Servaes, J. (2009). Media for social transformation: advocacy for peace. In *SIGNIS World Congress in Chiang Mai, Thailand*.

41. Sutton, J., Spiro, E. S., Johnson, B., Fitzhugh, S., Gibson, B., & Butts, C. T. (2014). Warning tweets: Serial transmission of messages during the warning phase of a disaster event. *Information, Communication & Society*, *17*(6), 765-787.
42. Tacchi, M. J., Joseph, S., & Scott, J. (2003). Evaluation of an emergency response service. *Psychiatric Bulletin*, *27*(4), 130-133.
43. United Nations Office for Disaster Risk Reduction. (2023). *Annual report 2022*. https://www.undrr.org/annual-report/2022.
44. Vaughan, E., & Seifert, M., 1992. Variability in the framing of risk issues. Journal of Social Issues, 48(4). 119-135
45. Wisner, B., Gaillard, J. C., & Kelman, I. (2012). *Handbook of hazards and disaster risk reduction*. Routledge.
46. Wisner, B., Gaillard, J. C., & Kelman, I. (2012). *Handbook of hazards and disaster risk reduction*. Routledge.
47. Wachinger, G., Renn, O., Begg, C., & Kuhlicke, C. (2013). The risk perception paradox—implications for governance and communication of natural hazards. *Risk analysis*, *33*(6), 1049-1065.
48. Wisner, B., Gaillard, J. C., & Kelman, I. (2012). *Handbook of hazards and disaster risk reduction*. Routledge.