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Health Workforce Communication Model in Decentralized Disaster Mitigation

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Authors
Zuryaty Z.*[1] *MSc*
Lutfi M.[2] *MSc*
Ahied M.[3] *MSc*

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[1]Department of Emergency, Faculty of Nursing, Noor Huda Mustofa University, Bangkalan, Indonesia
[2]Department of Medical Nursing, Faculty of Nursing, Noor Huda Mustofa University, Bangkalan, Indonesia
[3]Department of Science, Faculty of Science, Trunojoyo University Madura, Bangkalan, Indonesia

***Correspondence**
Address: Department of Emergency, Faculty of Nursing, Noor Huda Mustofa University, Jl. RE. Martadinata No 45, Mlajah, Bangkalan, East Java, Bangkalan, Indonesia. Postal Code: 69112
Phone: +92 (812) 67425448
zuryatyahied@gmail.com

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ABSTRACT

Aims This study aimed to analyze the communication model of health workers in decentralized disaster mitigation, where the high risk of disaster makes this an area that requires special attention in disaster management efforts.

Instrument & Methods This explanatory quantitative study recruited 214 health workers from primary healthcare institutions in East Java, Indonesia (2025). Using a validated instrument, it measured customer focus, leader commitment, situational awareness, media partnership, and health workforce communication. Direct relationships among parameters were tested using partial least squares structural equation modeling.

Findings Most health workers were aged 20–40 years (51.4%) and female (50.5%). Reliability and convergent validity were supported (Cronbach's alpha: 0.741–0.966; composite reliability: 0.836–0.960; AVE>0.5). Discriminant validity was confirmed via the Fornell–Larcker criterion. In PLS-SEM, customer focus (β=0.735; t=2.783; p<0.001), leader commitment (β=0.621; t=2.782; p<0.001), situational awareness (β=0.542; t=2.881; p<0.001), and media partnership (β=0.387; t=2.987; p<0.001) significantly and positively predicted health workforce communication, with the strongest effects from leader commitment (f^2=0.287) and situational awareness (f^2=0.280).

Conclusion Strengthening customer focus, leader commitment, situational awareness, and media partnership improves decentralized health workforce communication, while careful selection and coordinated management of a diverse workforce are essential for effective disaster mitigation.

Keywords Communication; Situational Awareness; Digital Media; Health Worker; Disasters

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Introduction

When a disaster strikes, several measures are necessary, involving a wide range of players [1], including institutions such as Disaster Health Management, which must work with and rely on different stakeholders [2]. Many municipalities worldwide are expected to face increased losses from major natural catastrophe events, such as floods, storms, and wildfires [3]. The capacity to adapt from previous catastrophes will be vital for improving local readiness for future events and minimizing disaster risk [4]. Information and communication technology is critical for enabling data collection and ensuring communication strategies that meet demands for speed and accuracy [5]. The high disaster risk makes this area a priority in disaster management efforts [6]. Therefore, it is important to understand disaster dynamics in this region to design more effective strategies to reduce the impact of disasters on the community and the environment [7]. This has been demonstrated notably by US agencies, local governments, and emergency services, as well as by European towns and school districts. Studies show that public relations officers, government agencies, and the general public have effectively used social media to convey accurate information and verify it to debunk rumors during catastrophes [8]. Only a few studies have focused on the recovery and preparedness phases, and on countries in the Global South, with the exception of Australia. Most studies have not examined the demographics of social media users beyond their geographic location, status in/out of the disaster zone, and the frequency and content of their posts [9].

The internet-based disaster information and data systems and social media used by Indonesian Disaster Health Management [10] currently provide inadequate data and information for public disaster communication and cannot meet the needs of the various agencies involved in disaster management [11]. Unlike population data, for which the agency responsible for providing it has no activities that rely on it, almost all Disaster Health Management activities require disaster data and information for their planning and implementation [12].

Communication is an important channel for agencies, particularly Disaster Health Management [13], to understand and implement effective disaster communication strategies [14], not only during emergency response but also in planning and implementing activities at all stages of disaster response [15]. To achieve successful, long-term communication in disaster mitigation programs, efforts must be made to build appropriate communication mechanisms that enable collaboration between scientists and local populations [16]. Haddow & Haddow identify five dimensions of disaster communication: customer focus, which means understanding what information the public requires; leader commitment, which refers to how a leader performs their role in an emergency response situation and requires a commitment to effective and active communication; situational awareness, which refers to effective communication when collecting, analyzing, and disseminating accurate disaster information; media partnership, which entails partnering with the media to acquire information and then share it with the public; and incorporating communication into disaster mitigation planning and operations, which requires support in a variety of ways, both soft and hard power [17]. The soft power method involves preparing the community for disasters through outreach and knowledge sharing [18].

The critical importance of disaster data, information, and communication, combined with the high complexity of their management strategies, has prompted researchers to conduct a more in-depth investigation into the disaster mitigation communication strategies of Indonesian Disaster Health Management [19]. We selected the heads of the Emergency and Logistics Division and the Prevention and Preparedness Division [20].

This study aimed to assess whether the communication tactics used are effective in conveying disaster management information and knowledge to the public, and to identify any barriers to such communication.

Instrument and Methods

This explanatory quantitative study involved 214 health workers from healthcare institutions in East Java, Indonesia, in 2025.

Explanatory quantitative research examined the causal relationships among latent parameters and fluent parameters [21] and health worker communication in decentralized disaster mitigation. The explanatory design examined five dimensions of disaster communication, including customer focus, leader commitment, situational awareness, and media partnership.

A total of 220 health workers were screened for participation as primary data. Of these, 4 were excluded (2 were in poor health and 2 refused). This left 216 health workers selected through simple random sampling. The 216 health workers were then assigned to the study samples. During eligibility screening, 2 were excluded for incomplete data and 2 for unknown reasons. Finally, 214 samples were analyzed (Figure 1).

Data were collected from health workers with at least 1 year of experience in providing and conducting disaster communication to handle what happened and related to the research parameters.

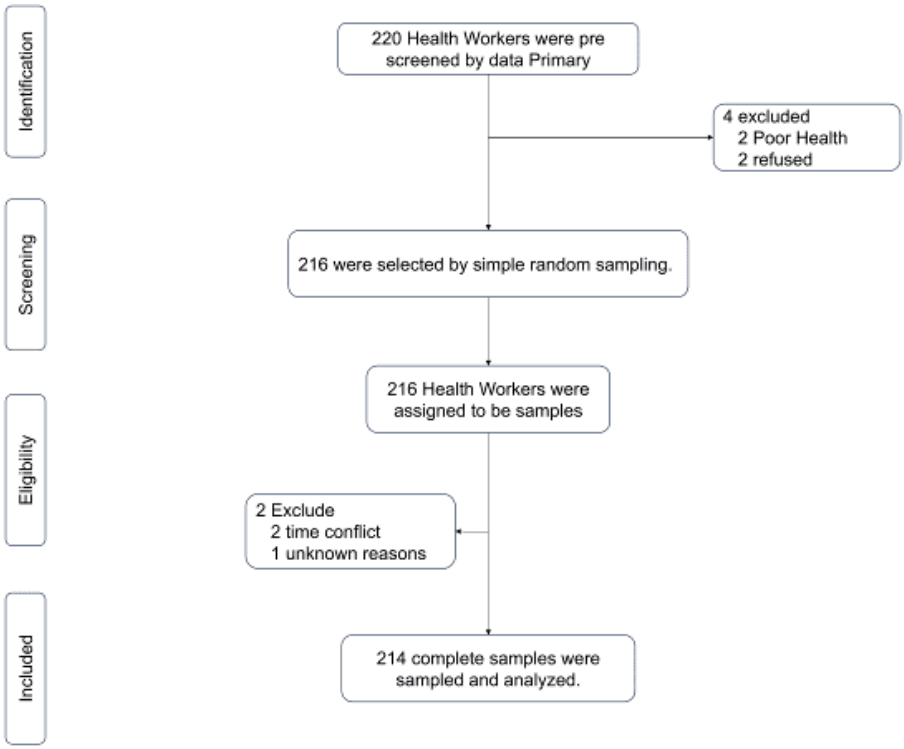

Figure 1. Assessment, randomization, and finalization of the sample

The study determined its SEM sample size using a commonly used rule of thumb: the minimum required sample size should be 5 to 10 times the number of estimated parameters. In this model, the number of parameters was calculated from the measurement and structural components. Specifically, customer focus had 4 parameters; leader commitment had 5; situational awareness had 5; media partnership had 4; and health workforce communication had 4. In addition, the model included 4 arrow directions (or correlations). Therefore, the total number of estimated parameters was 26. Multiplying 26 by 10 produced a maximum target sample size of 260. Ultimately, the study applied a fixed sample size of 214 participants. Data were collected using an approved, validated self-administered structured questionnaire that measured customer focus, leader commitment, situational awareness, media partnership, and health workforce communication on a five-point Likert scale (1=strongly disagree to 5=strongly agree). The instrument remained applicable to decentralized health settings while preserving construct validity. Discriminant validity was supported by the following values: customer focus (0.878), leader commitment (0.872), situational awareness (0.829), media partnership (0.881), and health workforce communication (0.816). Structural validity was confirmed by a single-factor, unidimensional model with a factor score of 0.978. Internal consistency was strong, with Cronbach's alpha=0.843 and a Guttman split-half coefficient=0.941.

The study used a main data model based on a questionnaire administered to healthcare staff. Because the survey was relatively small, it was conducted through a web-based form created in Google Forms. The questionnaire was developed around key factors—customer focus, leader commitment, situational awareness, and media partnership—and was distributed to 214 healthcare professionals in East Java, Indonesia via a link that staff could access at their workplace. It included closed-ended Likert-scale items, multiple-choice questions, and open-ended questions. After administration, validity and reliability were assessed to confirm that the instrument was appropriate and consistent, using Cronbach's alpha for reliability and factor analysis/construct validity for validity. The questionnaire had also been pilot-tested for accuracy and suitability, and it followed standards for identifying public healthcare institutions by type, location, and patient population [21].

Data were screened and analyzed using the SEMPLS tool to assess correlations and develop models based on the Investigation of Health Workforce Communication Model in Decentralized Disaster Mitigation. SmartPLS 4 was used to conduct SEM and PLS analyses. PLS-SEM was employed for theory construction, prediction, and advanced modeling with multiple latent parameters [22]. Model

assessment was conducted in two stages, and path coefficients and indirect effects were tested using bootstrapping. The significance of direct and mediated effects was inferred from Smart-PLS bootstrapping results [23].

Findings

A high proportion of health workers aged 20-40 years (51.4%) was observed, and, by gender, most were female (50.5%; Table 1).

Table 1. Frequency of health workers' characteristics

Parameter		Frequency (%)
Age (years)	20-40	110 (51.4)
	41-60	104 (48.6)
Gender	Male	106 (49.5)
	Female	108 (50.5)
Place of residence	Urban	112 (52.3)
	Rural	102 (47.6)
Education	Diploma	97 (45.3)
	Bachelor's degree	103 (48.2)
	Master's degree	14 (6.5)
	Doctorate	0 (0.0)
Profession	Medical doctor	31 (14.4)
	Dentist	31 (14.4)
	Nurse	43 (20.0)
	Midwife	21 (9.8)
	Health promotion officer	21 (9.8)
	Epidemiologist	9 (4.3)
	Environmental health officer	6 (2.8)
	Medical laboratory technologist	21 (9.8)
	Pharmacist	15 (7.2)
	Nutritionist	16 (7.5)

Reliability assessment using Cronbach's alpha, composite reliability, and AVE indicated that all constructs were measured consistently and dependably. Cronbach's alpha values were high and satisfactory across constructs—customer focus (0.823), leader commitment (0.815), situational awareness (0.741), media partnership (0.878), and health workforce communication (0.966). Composite reliability was also high for all constructs, ranging from 0.836 (leader commitment) to 0.960 (health workforce communication), confirming strong internal consistency. Convergent validity was supported because all AVE values were above the minimum threshold of 0.50, with customer focus (0.735), leader commitment (0.671), situational awareness (0.841), media partnership (0.717), and health workforce communication (0.861). Overall, the measurement instrument is reliable and demonstrates adequate convergent validity for assessing stunting prevention, as informed by the Health Workforce Communication Model in Decentralized Disaster Mitigation.

The Fornell-Larcker requirements stipulated that the products of the square roots of the AVE for each latent component needed to be considerably greater than the correlation coefficients between the specific construct and its counterparts. Strong evidence of discriminant validity was found, as the diagonal elements (square roots of the AVEs) were greater than the off-diagonal inter-construct correlations (Table 2).

Table 2. Fornell–Larcker Criterion for Discriminant Validity Assessment

Construction	5	4	3	2	1
1. Customer focus	0.287	0.875	0.278	0.733	0.872
2. Leader commitment	0.382	0.768	0.297	0.819	
3. Situational awareness	0.295	0.297	0.809		
4. Media partnership	0.278	0.898			
5. Health workforce communication	0.789				

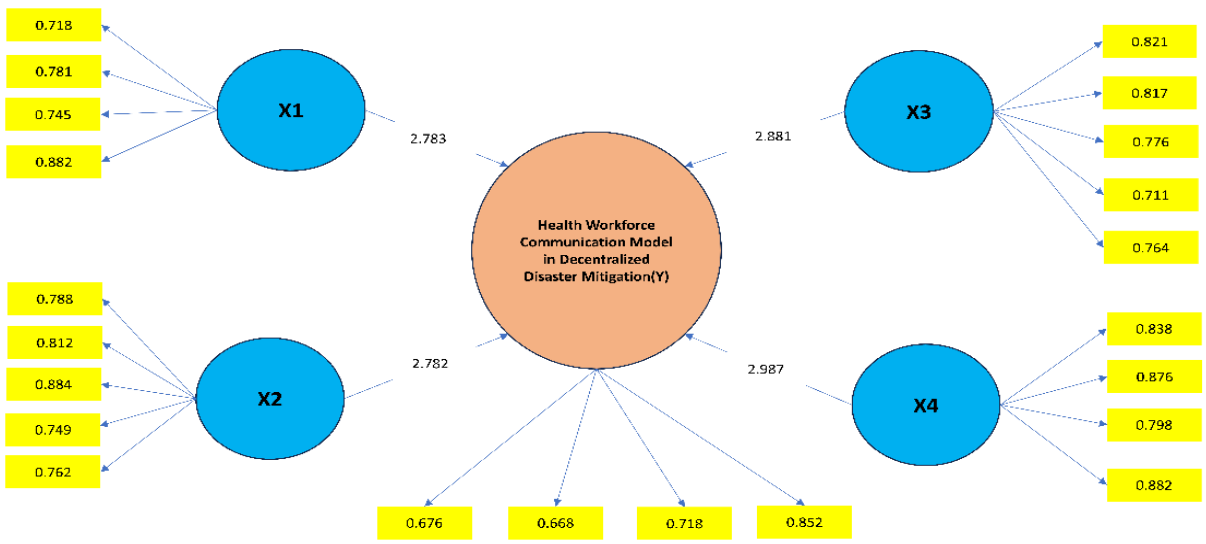

Figure 2. Structural model results for health workforce communication in decentralized disaster mitigation

Customer focus (β=0.735; t=2.783; p<0.001), leader commitment (β=0.621; t=2.782; p<0.001), situational awareness (β=0.542; t=2.881; p<0.001), and media partnership (β=0.387; t=2.987; p<0.001) all showed statistically significant positive direct effects on health workforce communication. Effect size (f^2) indicated that the strongest impact was from leader commitment (f^2=0.287), followed by situational awareness (f^2=0.280), customer focus (f^2=0.211), and media partnership (f^2=0.235). Overall, all hypothesized direct relationships were significant (p<0.001).

The indicators of the Health Workforce Communication Model in Decentralized Disaster Mitigation included customer focus, leader commitment, situational awareness, media partnership, and health workforce communication. The Health Workforce Communication Model in decentralized disaster mitigation was analyzed using PLS-SEM (Figure 2). The model showed the structural relationships among customer focus, leader commitment, situational awareness, and media partnership as predictors of health workforce communication, as well as the hypothesized paths and their strength and direction using standardized path coefficients (β) and/or significance indicators (e.g., t-values). Overall, customer focus, leader commitment, situational awareness, and media partnership positively influenced health workforce communication.

Discussion

This study aimed to analyze the communication model of health workers in decentralized disaster mitigation. Communication between registered nurses and unlicensed assistive personnel can be enhanced through clearly defined roles and duties, improved delegation procedures, more efficient communication, and better interpersonal interactions. Future studies should focus on improving communication procedures and developing registered nurses' delegation abilities through education [24]. This was further supported by research in India, which found that communication among health workers is the most important ingredient in delivering patient-centered care (customer focus). Healthcare providers can understand patients' needs, hopes, and conditions as a whole by using effective communication techniques, such as listening empathetically, providing clear explanations, and building positive relationships. However, without appropriate communication, health services tend to be suboptimal because patients' requirements are not well transmitted or understood, resulting in treatments that are not fully patient-centered [25]. This differs somewhat in the United States, where, without effective communication, health services risk falling short of their objectives and failing to satisfy patients' requirements. In the context of disaster mitigation, this becomes especially critical, as emergency situations require the rapid, accurate, and understandable distribution of information to victims and other health professionals. Effective communication ensures priority treatment, reduces fear, and improves safety and service quality, allowing a customer-focused strategy to be implemented even during a crisis [26].

Mitigation entails mastering the required behavioral complexity through a deeper understanding of shared leadership, cultivating a mutually valued relationship aimed at collective identity, and leveraging collective efficacy, interdependence, complementary strengths, and the positive effects of psychological ownership and territoriality. Strategic organizational implementation includes criteria-based selection, appropriate support, and explicit accountability procedures, as well as the evaluation of leaders' actions and the model's efficacy. Overcoming these obstacles would promote agency and well-being, satisfied relationships, and successful collaborative work, allowing the dyad leadership model to reach its full potential [27]. Reviews differ in China. The presence of humble leadership in an organization significantly reduces burnout, with work engagement and subjective well-being mediating this relationship. In addition, the study shows that compassion buffers the correlations described above. The empirical evidence makes various contributions in theory and practice, the most important of which is the recognition of the fundamental value of humble leadership in mitigating the effects of burnout in healthcare administration [28].

Comparison with other studies in Michigan shows that effective leadership communication predicted burnout and willingness to stay more strongly than remuneration satisfaction and work-from-home flexibility. Feeling appreciated by the company moderated the association between leadership communication and the outcome factors [29]. To improve healthcare providers' preparedness for disasters, we propose integrating innovative technologies, such as virtual and augmented reality, to create immersive simulations that foster situational awareness and a resilient mindset for disasters. Addressing this knowledge gap will boost healthcare personnel's confidence and enhance patient outcomes during a crisis [30]. Compared with other research reviews, this suggests that individual characteristics such as attention, memory, past experience, personal aspirations, and cybersecurity training play important roles in determining situational awareness. In addition, environmental and system-level parameters, such as workload, information overload, system complexity, and over-reliance on automation, have a major influence on healthcare professionals' ability to spot cyber risks. The study emphasizes the need for integrated solutions that include user-centered system design,

awareness training, and efficient reporting channels. These findings contribute to the growing body of knowledge on human factors in cybersecurity and serve as a basis for improving incident identification and response in healthcare contexts [31].

Many of the most widely shared social media posts did not precisely align with the Intergovernmental Panel on Climate Change's core statements. Less than 25% of the posts included the report's summary statement, and around half suggested no remedies at all. Instead, they focused on the seriousness of the problem and the urgency of action required. Finally, there was a relatively low presence of voices from the organized climate countermovement, which frequently questions the necessity for broad-based and immediate mitigation action. We address the implications of our findings for future research and practical applications [32].

Compared with research in Indonesia, our work contributes to disaster communication theory by incorporating media into Indonesia's unique governance and socio-cultural environment to form the foundation of a collaborative strategy, providing a framework for improving preparedness, transparency, and community trust [33].

Other studies in the United States have developed a language model that can understand how people explain their condition in a 911 call, allowing Llama2 to assess the content, provide relevant directions to the telecommunicator, and generate workflows to alert government entities with the caller's information as needed. Another advantage of this language model is its ability to assist individuals during a major emergency, when the 911 system is overburdened, by providing users with simple instructions and alerting authorities to their location and emergency status [34].

Conclusion

Strengthening customer focus, leader commitment, situational awareness, and media partnership improves decentralized health workforce communication, while careful selection and coordinated management of a diverse workforce are essential for effective disaster mitigation.

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