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Yuliwulandari, Rika, Febriawan, Zulfan, El Mahroos, Rifda, Kusuma Devi, Debrina, Teguh Paripurno, Eko, Hendrianto Pratomo, Awang, Agung Cahyadi, Tedy, Noradika Maharani, Yohana, Idhom, Mohammad, Setyo Budi Witjaksono, Gideon, Aureldy Davonso Matualage, Kysara and Khan, Hafiz T.A. ORCID logo ORCID: <https://orcid.org/0000-0002-1817-3730> (2025) “URGENSI” platform development to enhance disaster preparedness among the elderly. In: The 17th Aceh International Workshop and Expo on Sustainable Disaster Recovery (AIWEST-DR 2025), 20-22 Aug 2025, London, United Kingdom.

<https://doi.org/10.1051/e3sconf/202565101008>

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“URGENSI” Platform Development to Enhance Disaster Preparedness Among the Elderly

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Abstract. Surabaya, Indonesia’s second-largest city, lies between the Waru and Surabaya faults, making it prone to earthquakes and frequent flooding due to its dense population and inadequate drainage system. Among its residents, approximately 350,000 elderly individuals are particularly vulnerable during disasters because of limited mobility, physical frailty, and difficulty accessing information. However, research on disaster preparedness among the elderly and the use of technology-based support remains limited. This study aimed to develop and test “URGENSI”, a web-based platform designed for the elderly around UPN “Veteran” Jawa Timur, following the ADDIE Model (Analysis, Design, Development, Implementation, Evaluation). Stakeholder discussions informed the design process. The application integrates two main components: 1) KESTANA Assessment, a self-assessment tool to evaluate disaster and health preparedness, and 2) educational modules (KESTANA education and KITANA education) offering self-learning materials on health, disaster readiness and emergency kit preparation. Functionality testing was

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conducted with 25 elderly participants living near UPN “Veteran” Jawa Timur. Results showed most respondents were neither healthy nor resilient when facing disasters. Nevertheless, participants rated the application as user-friendly, visually engaging, and easy to understand. Overall, URGENSI demonstrates strong potential to enhance disaster preparedness, support elderly health, and contribute to broader disaster risk reduction and community resilience efforts in Indonesia.

1 Background

Natural disasters are triggered by natural phenomena such as floods, landslides, coastal abrasion, tornadoes, droughts, forest and land fires, earthquakes, tsunamis, and volcanic eruptions [1]. According to data from the 2023 World Risk Index (WRI), ten countries rank highest in terms of disaster risk globally, the Philippines ranks first with the highest disaster risk index at 46.86%, followed by Indonesia at 43.5%, and India in third place with an index of 41.57% [2]. Indonesia experiences a particularly high frequency of natural disasters, especially volcanic eruptions and earthquakes. Located along the Pacific Ring of Fire, the country is among the most disaster-prone regions in the world [3]. Data from Indonesia’s National Disaster Management Agency (Badan Nasional Penanggulangan Bencana or BNPB) indicate that a total of 4,852 natural disaster events occurred across the country in 2023. Floods were the most frequent, accounting for 1,801 incidents, followed by extreme weather (1,135 incidents), forest and land fires (1,117), landslides (568), droughts (168), tidal waves or coastal abrasion (31), earthquakes (29), and volcanic eruptions (3) [4].

These disasters resulted in approximately 370 fatalities, 39 missing persons, and 536 individuals injured [5]. Older adults represent one of the most vulnerable population groups before, during, and after disasters. This is primarily due to the high prevalence of chronic illnesses, physical decline, cognitive impairments, dementia, and general frailty among this age group [6]. Physical limitations, coupled with diminished social support, often leave older adults living alone. This situation further increases their vulnerability to disaster impacts, as they may lack the physical capacity and family assistance necessary for timely response and recovery [7]. Moreover, the immune system in older individuals tends to function less effectively, reducing their ability to fight off infections caused by bacteria or viruses. These factors collectively contribute to making older adults one of the most at-risk groups during disasters, as their physical, cognitive, and social limitations significantly increase their likelihood of becoming victims in emergency situations [8].

Preparedness is an essential component of disaster management. Disaster preparedness enables older adults to formulate and plan necessary actions to be taken when a disaster occurs [9]. Older adults at the Puntodewo Tanjungsari Posyandu in Surabaya showed adequate disaster-related knowledge; however, their actual disaster experience and response were found to be inadequate [10]. In the current digital era, information and communication technology (ICT) holds significant potential in enhancing public literacy and preparedness for disasters. The use of digital platforms such as mobile applications, websites, or community-based information systems can serve as effective tools for education, early warning, and coordination in disaster response [11]. However, most existing platforms have not been specifically designed to reach older adults, particularly in terms of language, user interface, and modes of information delivery. This poses a substantial barrier to improving preparedness within this demographic group. Therefore, this study aims to develop a digital platform and field trials to determine people’s experience in using this digital platform.

2 Methods

2.1 Development Model

The development of the “URGENSI” platform was guided by the ADDIE model, which includes five systematic stages: Analysis, Design, Development, Implementation, and Evaluation. This model was selected to ensure a structured and user-centered approach in creating a digital platform tailored to enhance disaster preparedness among the elderly.

2.1.1 Analysis

In the analysis phase, a needs assessment was conducted to identify the specific challenges and preparedness gaps faced by elderly individuals in disaster situations. Data were gathered through literature review, expert consultation and informal interviews with elderly residents in the area surrounding UPN “Veteran” Jawa Timur. Key findings highlighted limited access to disaster-related information, low digital literacy, and a lack of elderly-specific preparedness tools.

2.1.2 Design

The design phase involved translating these needs into specific platform features and learning objectives. The platform was planned to include educational modules, preparedness checklist, and a consultation feature. User interface design prioritized accessibility, with large icons, simple language, and audio-visual support to accommodate sensory or cognitive limitations common among the elderly. A content structure was developed based on KESTANA (Elderly Health Resilience in Disasters) principles and government disaster preparedness guidelines.

2.1.3 Development

During the development phase, the platform prototype was built collaboratively by software developers and experts in gerontology and disaster management. Educational content was produced in multiple formats including text, infographics, and short videos. The KESTANA self-assessment tool was embedded to allow elderly to evaluate their personal disaster and health preparedness. The platform also included a disaster and health consultation feature, enabling users to submit questions directly to professionals.

2.1.4 Implementation

In the implementation phase, the prototype was tested with 25 elderly participants living near UPN “Veteran” Jawa Timur. A short orientation was conducted to introduce participants to the platform and assist them in navigating its features, particularly the KESTANA assessment. Participants were encouraged to use the platform independently or with optional researcher assistance for those unfamiliar with mobile technology.

2.1.5 Evaluation

In the evaluation phase, data were collected to assess both platform usability and its effectiveness in increasing knowledge and preparedness through user satisfaction questionnaire. The satisfaction instrument evaluated content clarity, ease of use, visual design, and perceived usefulness. Feedback was analyzed to inform revisions and future improvements to the platform.

2.2 Platform Trial

The “URGENSI” platform was trialed with 25 elderly participants residing in the area surrounding UPN “Veteran” Jawa Timur. Before the trial, the researcher conducted an orientation session to guide participants on how to use the platform, with particular emphasis on how to complete the KESTANA assessment, an instrument designed to evaluate elderly health preparedness in the face of disasters. During the session, the researchers also explained how to navigate and utilize the platform’s features, including disaster and health education modules, as well as a consultation feature that allows users to ask questions related to disaster preparedness and health management. Throughout the trial, participants interacted with the platform either independently or with assistance, depending on their technological proficiency. After the usage period, participants were asked to provide feedback on their user experience by completing an online questionnaire. This feedback focused on their satisfaction with the platform’s usability, content, and perceived usefulness in improving their preparedness and health awareness.

2.3 Data Collection

Data collection in this study was conducted among 25 elderly individuals residing in the area surrounding UPN “Veteran” Jawa Timur. To assess their level of disaster preparedness and health awareness, participants were asked to engage with the “URGENSI” platform using their own mobile devices. For participants who faced difficulties in operating the device, assistance was provided by the research team to ensure equitable access and usability. The platform included a preparedness checklist, interactive modules containing educational content, which participants were to complete over a set period. Following this, to evaluate user satisfaction, participants were asked to complete an online questionnaire that captured their experience using this platform. The questionnaire consisted of Likert-scale items assessing four key dimensions: content quality, ease of use, visual and interface design, and perceived usefulness.

Table 1. User Satisfaction Scoring.

No.	Type of User Satisfaction	Score	Information
1.	Content quality : How easy was it for you to understand the information presented in the “URGENSI” platform?	1	Not understandable
		2	Difficult to understand
		3	Easy to understand
		4	Very easy to understand
2.	Ease of use : How easy was it for you to operate the platform on your own?	1	Could not use
		2	Difficult to use
		3	Easy to use
		4	Very easy to use
3.	Interface and visual design : How would you rate the readability and appearance of the text, icons, and overall layout?	1	Uncomfortable to view
		2	Slightly hard to read
		3	Clear and comfortable
		4	Very clear and comfortable
4.	Perceived Usefulness : To what extent did the platform help you feel more prepared for disasters?	1	Not helpful
		2	Slightly helpful
		3	Quite helpful
		4	Very helpful

2.4 Data Analysis

Data were analyzed using both quantitative and qualitative methods. The analysis of data focused on two main components: (1) the level of health and disaster preparedness among the elderly, and (2) user feedback related to satisfaction with the platform. Quantitative data obtained from data on health and disaster preparedness among the elderly were analyzed using descriptive statistics to determine differences in preparedness in the elderly. Whereas, qualitative data was obtained from user satisfaction data. User satisfaction data were analyzed using percentage distributions to assess the level of satisfaction in areas such as content clarity, ease of use, visual design and perceived usefulness. The responses were categorized into score intervals to determine satisfaction levels (very dissatisfied to very satisfied).

3 Results

3.1 Description of the “URGENSI” Platform

The findings of this study led to the development of a digital platform named **URGENSI** (<https://www.lansiatangguh.com>), which is designed to support disaster preparedness specifically among older adults and families. URGENSI provides accessible, practical information aimed at promoting healthy aging and strengthening family resilience in the face of disasters (Figure 1). The platform integrates several key features tailored to the needs of its target users. One of the core components is the Family and Elderly Health Resilience Assessment Tool (KESTANA), which enables users to evaluate their health status and preparedness level. In addition, the platform includes the Disaster Resilience Kit (KITANA), which offers essential guidelines and tools for disaster readiness. Educational modules are also embedded, including KESTANA Education, which provides structured learning content on maintaining physical, mental, and social well-being of older adults to improve their capacity for disaster response and recovery, and KITANA Education, which delivers guidance on assembling and using essential emergency supplies tailored to the needs of older adults and their families.

Furthermore, URGENSI features a Disaster-Related Health Consultation Service, allowing users to seek professional advice on health concerns in the context of emergency preparedness. Collectively, these components make URGENSI a comprehensive, elderly-friendly platform that aims to bridge the digital gap and improve disaster resilience through inclusive, health-oriented technology.

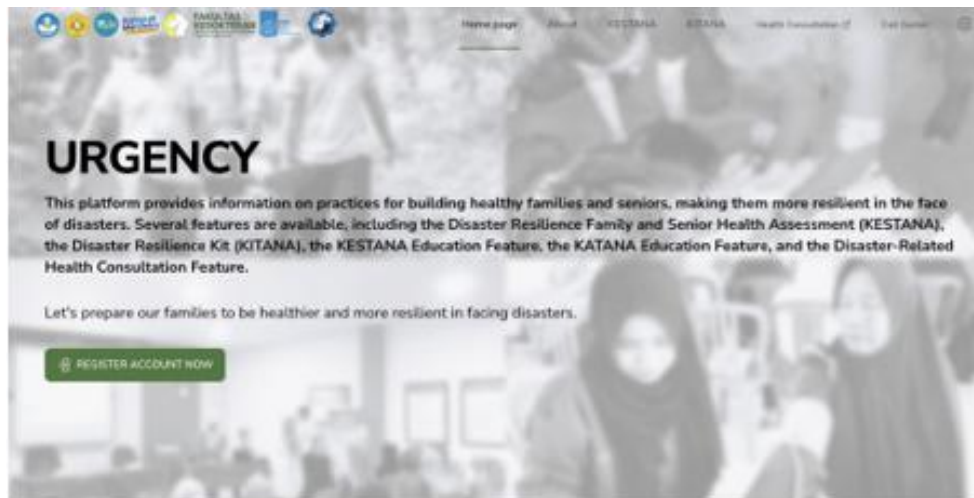


Fig 1. Homepage of “URGENSI” Platform.

3.2 Description of the “URGENSI” Platform Features

To address the specific needs of older adults and families in disaster preparedness, the URGENSI platform incorporates several integrated features designed to enhance both Awareness and practical readiness. These features are systematically organized to support health resilience and disaster response capabilities. An overview of the platform’s main components is illustrated in Figure 2.

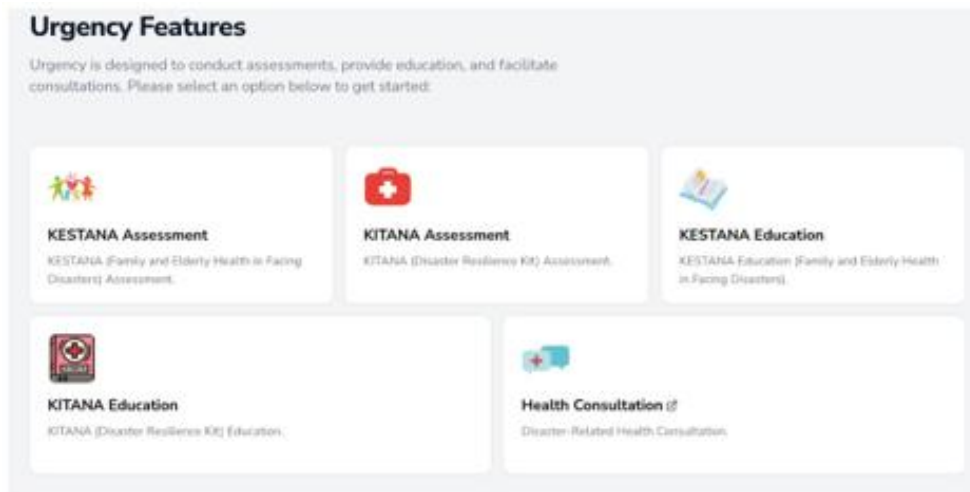


Fig 2. “URGENSI” Platform Features.

3.2.1 KESTANA (Family and Elderly Health Resilience Assessment)

The KESTANA (Kesehatan Keluarga dan Lansia Tangguh Bencana) assessment is designed to evaluate various aspects of elderly individuals' preparedness and resilience in the context of health and disaster situations. This assessment focuses on four key areas. First, it examines the overall health status of older adults, including the presence of chronic conditions and access to routine medical care. Second, it explores practices to maintain health quality, such as nutrition, physical activity, and access to healthcare services. Third, the assessment measures the elderly's ability to use technology, particularly in accessing health information, communication tools, and emergency alerts. Lastly, KESTANA captures personal experiences of older adults during past disasters, including their coping strategies, challenges faced, and the support systems that were available to them. Through these dimensions, KESTANA provides a comprehensive understanding of how well-prepared elderly individuals and their families are in maintaining health and ensuring resilience during emergencies (Figure 3).

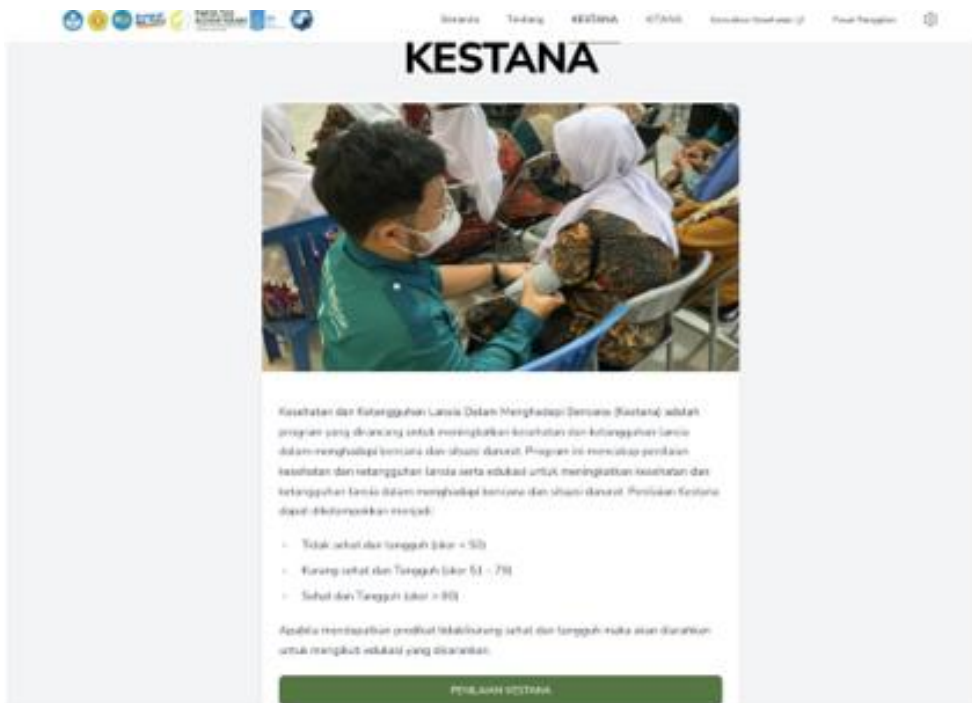


Fig 3. “URGENSI” Platform Features.

3.2.2 KITANA (Disaster Resilience Kit) Assessment

The KITANA (Disaster Resilience Kit) Assessment is a tool developed to evaluate the availability, completeness, and readiness of essential supplies and equipment needed by families, especially those with elderly members, to respond effectively in disaster situations. This assessment focuses on the presence of critical items such as food, clean water, first aid kits, medications, important documents, flashlights, batteries, communication tools, and

personal protective equipment. It also considers whether these items are stored in an accessible, organized, and easily transportable manner. Furthermore, the KITANA assessment evaluates the family's awareness and routine in checking and maintaining the contents of their disaster kit to ensure its functionality when needed. By identifying gaps and strengths in household preparedness, the KITANA assessment serves as a vital tool in promoting disaster resilience, ensuring that families, particularly those with vulnerable members like the elderly, are better equipped to face emergencies with confidence and reduced risk (Figure 4).



Fig 4. “URGENSI” Platform Features.

3.2.3 KESTANA (Family and Elderly Health Resilience Education

The KESTANA (Family and Elderly Health Resilience) Education is an educational initiative aimed at increasing awareness, knowledge, and skills related to health maintenance and disaster preparedness among elderly individuals and their families. This program focuses on key topics such as promoting healthy lifestyles, managing chronic illnesses, understanding age-related vulnerabilities, and practicing preventive healthcare. In addition, the education includes practical guidance on disaster preparedness, such as how to develop emergency plans, identify risks, and maintain communication during crises. It also introduces basic digital literacy to help older adults access reliable health and disaster-related information through technology. By integrating health education with disaster resilience strategies, KESTANA Education empowers families to actively support the well-being and safety of elderly members, strengthening their capacity to respond effectively to emergencies and reduce health-related risks during disasters (Figure 5).

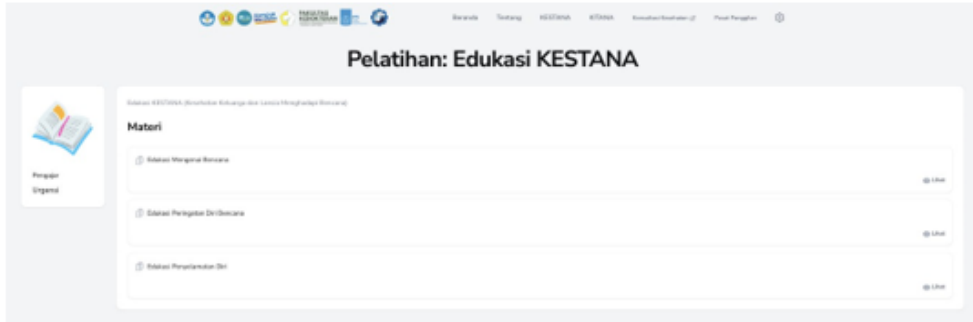


Fig 5. “URGensi” Platform Features.

3.2.4 KITANA (Disaster Resilience Kit) Education

The KITANA (Disaster Resilience Kit) Education is a learning program designed to increase awareness and knowledge about the importance of preparing essential items needed during emergencies or disasters. This educational component teaches individuals and families, especially those with elderly members, how to assemble, manage, and maintain a comprehensive disaster resilience kit. It covers the identification of critical supplies such as food, water, medications, personal hygiene items, important documents, first aid materials, and communication tools. Participants are also guided on how to properly store and regularly update the kit to ensure accessibility and usability when disasters strike. Additionally, KITANA Education emphasizes the role of preparedness in reducing panic and increasing survival chances, especially for vulnerable populations like older adults. Through this program, families become better equipped with the practical skills and understanding needed to build resilience and respond effectively to emergency situations (Figure 6).



Fig 6. “URGensi” Platform Features.

3.2.5 Disaster-related Health Consultation

Disaster-related Health Consultation is a service aimed at providing targeted medical advice, guidance, and support to individuals particularly the elderly and vulnerable groups before, during, and after a disaster. This consultation focuses on addressing health risks associated with disasters, such as the management of chronic diseases, mental health support, access to medications, and the prevention of disease outbreaks in emergency settings. It also includes personalized health assessments, recommendations for maintaining well-being during crises, and education on recognizing early warning signs of health deterioration. Furthermore, disaster-related health consultations help individuals understand how to navigate healthcare services during emergencies, including where to seek help and how to communicate specific medical needs. By offering timely and relevant health information, this service plays a crucial role in enhancing community resilience, minimizing health complications, and supporting recovery efforts in the aftermath of a disaster (Fig 7.).

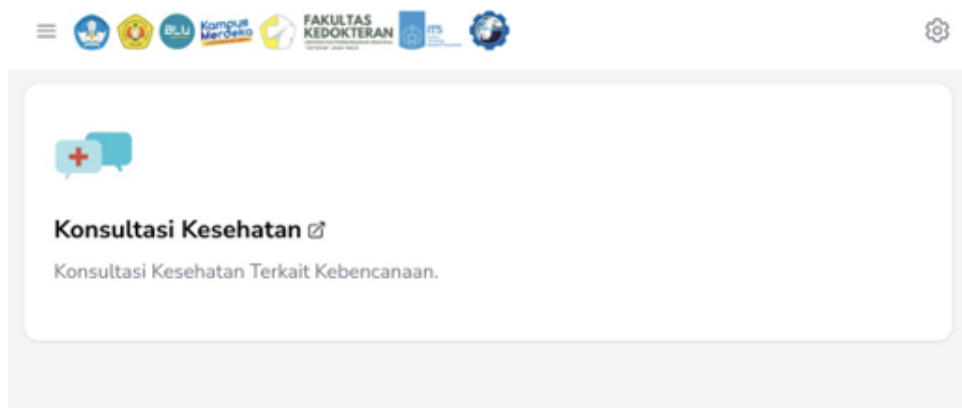


Fig 7. “URGENSI” Platform Features.

3.3 Disaster Preparedness for the Elderly

Data on disaster preparedness and health were collected using the “URGENSI” platform among 25 elderly individuals living around UPN "Veteran" Jawa Timur Surabaya. The results are presented in Figure 8. Figure 8 illustrates the distribution of elderly individuals across three categories of disaster preparedness and health: *Not healthy and resilient*, *Less healthy and resilient*, and *Healthy and resilient*. The data reveals a striking imbalance, with the vast majority (92%) of older adults falling into the *Not healthy and resilient* category. This indicates that most elderly individuals in the sample lack both adequate health status and the capacity to withstand or respond effectively to disaster situations. Interestingly, there were no respondents (0%) categorized as *Less healthy and resilient*, suggesting that the participants were either in a severely unprepared condition or already met both health and resilience standards.

Only 8% of the elderly were classified as *Healthy and resilient*, representing a small fraction of the population who possess both good health and the necessary preparedness to face disasters. These findings highlight a critical need for targeted interventions to improve both health literacy and disaster readiness among older adults, particularly through accessible and tailored support systems such as the URGENSI platform.

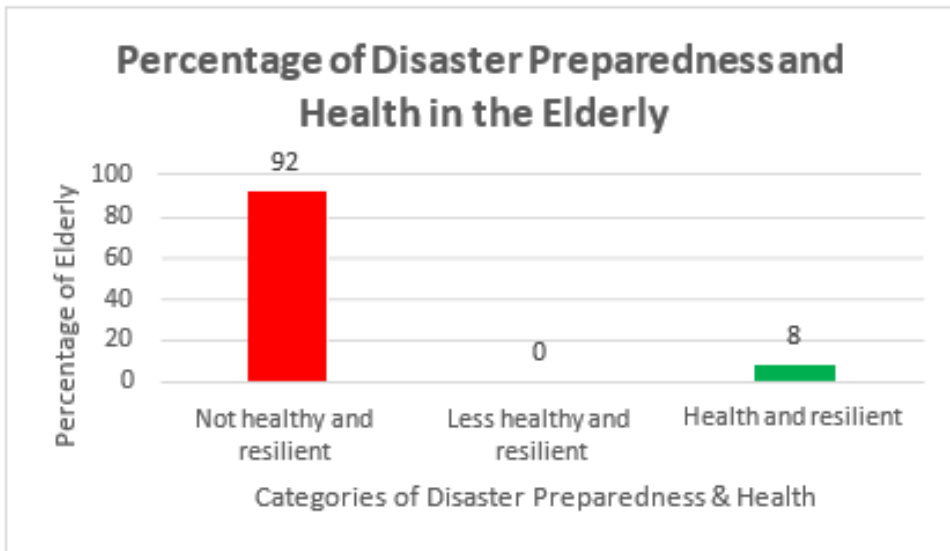


Fig 8. Percentage of Disaster Preparedness and Health in the Elderly.

3.4 Assessment of Elderly Satisfaction with Platform Usage

An evaluation of user satisfaction regarding four key aspects quality of content, ease of use, interface and visual design, and perceived usefulness was conducted among 25 older adults around UPN "Veteran" Jawa Timur. Data were collected through an online questionnaire specifically designed for elderly users. The results of this assessment are presented in Figures 9 to 12. Figure 9 illustrates user satisfaction with the content quality of the *URGENSEI* platform as reported by 25 elderly respondents. The graph shows that 100% of participants rated the content quality with a score of 4 on the satisfaction scale, indicating a very high level of satisfaction.

No respondents gave lower scores (1, 2, or 3), suggesting that the platform's content was perceived as relevant, accurate, and appropriate for the needs and comprehension levels of older adults. This finding reflects the effectiveness of the educational material and information provided through *URGENSEI*, particularly in its clarity, usefulness, and alignment with disaster preparedness goals for the elderly population.

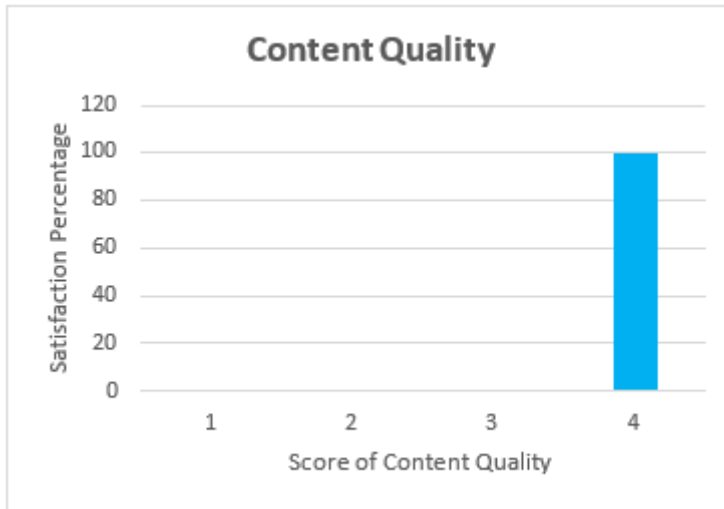


Fig 9. Percentage of Satisfaction in Content Quality.

Figure 10 presents the level of user satisfaction regarding the ease of use of the *URGENSEI* platform among 25 elderly participants. The results indicate that 100% of respondents rated the platform with a score of 4 on the ease-of-use scale, reflecting a very high degree of usability. No participants assigned lower scores (1, 2, or 3), suggesting that the platform interface and navigation were considered intuitive, accessible, and manageable even by older adults who may have limited experience with digital technology. This outcome highlights the platform's success in incorporating user-centered design principles that accommodate the specific physical and cognitive needs of elderly users, thereby minimizing barriers to access and encouraging continued engagement.

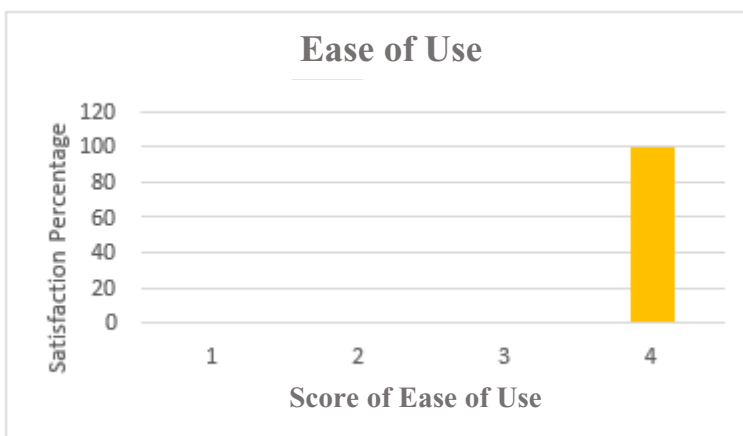


Fig 10. Percentage of Satisfaction in Ease of Use

Figure 11 illustrates user satisfaction with the interface and visual design of the *URGENSEI* platform, based on feedback from 25 elderly participants. The results show that 100% of

respondents assigned a score of 4, representing the highest level of satisfaction on the evaluation scale. No lower scores (1–3) were recorded, indicating a universally positive response to the platform’s aesthetic quality and visual usability. This result suggests that the design elements, including layout, color scheme, font size, and iconography, were perceived as clear, visually appealing, and accessible by older adults. The consistent satisfaction also reflects the importance of age-sensitive design considerations in digital platforms, especially when targeting users with potential visual or cognitive limitations. The outcome reinforces that a well-designed interface plays a crucial role in supporting user engagement and learning, particularly in disaster preparedness contexts.

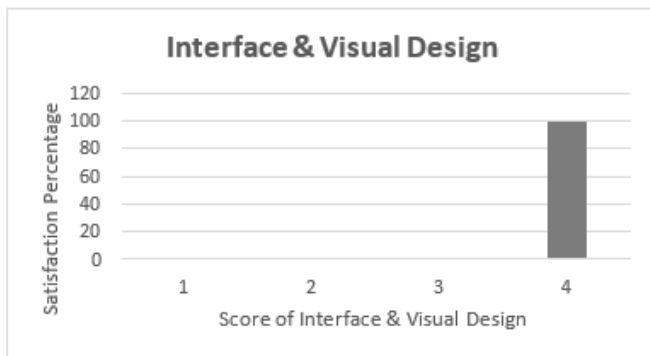


Fig 11. Percentage of Satisfaction in Interface & Visual Design.

Figure 12 illustrates user satisfaction with the perceived usefulness of the platform as reported by the respondents. The graph shows that 100% of participants rated the perceived usefulness with a score of 4 on the satisfaction scale, indicating a very high level of satisfaction. No respondents assigned lower scores (1, 2, or 3), suggesting that the platform was consistently viewed as highly beneficial and effective in meeting user expectations. This unanimous rating reflects the platform's success in delivering features or content that are practical, valuable, and aligned with user needs, thereby reinforcing its overall usefulness and relevance in the intended context.

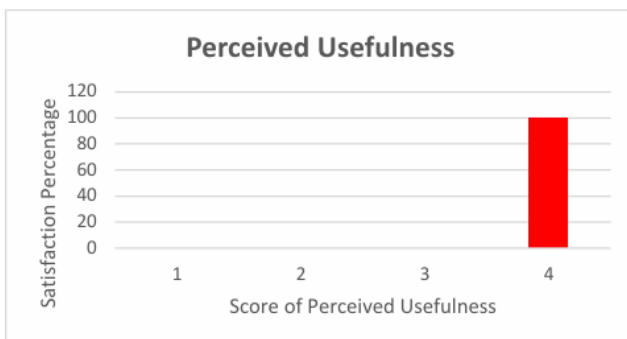


Fig 12. Percentage of Satisfaction in Perceived Usefulness.

4 Discussion

This study highlights a critical gap in disaster preparedness and health resilience among elderly individuals, as evidenced by the fact that 92% of respondents fell into the “not healthy and resilient” category. This finding underscores the compounded vulnerability of older adults in disaster contexts, which is frequently attributed to age-related declines in physical health, presence of chronic diseases, limited mobility, and insufficient knowledge of preparedness strategies [20]. Such vulnerability is further exacerbated by poor access to health services, technology, and information, especially in lower-income or rural areas. The absence of respondents in the “less healthy and resilient” category suggests a polarization, either individuals are completely unprepared or fully prepared, emphasizing the need for intermediate, progressive educational interventions that can gradually build resilience and health capacity. The introduction of the URGENSI platform represents a strategic response to this issue. Its integrated features, including KESTANA (Family and Elderly Health Resilience) Assessment, KITANA (Disaster Resilience Kit), educational modules, and disaster-related health consultations, are tailored specifically for older adults and their families. This aligns with research that advocates for holistic, person-centered approaches in health education and emergency preparedness [21]. The high satisfaction ratings in all aspects evaluated content quality, ease of use, interface design, and perceived usefulness suggest that the platform succeeded in meeting the needs of its target audience. Notably, 100% of respondents gave the maximum score across all categories, indicating exceptional levels of user engagement and perceived relevance.

From a usability perspective, the platform’s success can be linked to the application of age-friendly digital design principles, such as large fonts, simple navigation, minimal cognitive load, and clear visual hierarchy. These elements are essential for improving accessibility for users with age-related visual, motor, or cognitive limitations. Additionally, the incorporation of disaster consultation services is vital, as elderly individuals often have limited access to timely medical guidance during emergencies. This feature ensures continuity of care and enhances confidence among elderly users when navigating disaster scenarios. Another important aspect is the emphasis on digital literacy and family involvement, which is embedded in both KESTANA and KITANA educational modules.

Studies have shown that disaster resilience in older populations is not only influenced by individual preparedness but also by the quality of family and community support networks. By encouraging family-based assessments and preparedness actions, the URGENSI platform fosters a collaborative approach that distributes the burden of readiness and ensures that elderly individuals are not left to manage disaster risks alone. In terms of broader implications, the URGENSI platform can serve as a scalable model for elderly disaster preparedness education in other regions, especially within the ASEAN context, where aging populations are rapidly increasing.

As digital transformation becomes more inclusive, platforms like URGENSI could be integrated into public health strategies and local government disaster response programs, especially in areas prone to natural hazards such as floods, earthquakes, or pandemics. This approach is consistent with the global call for integrating disaster risk reduction into health and aging agendas, as outlined by the WHO and UNDRR. Future research should explore the longitudinal impact of platform usage on disaster outcomes, health behavior change, and resilience-building. Additionally, examining the role of socioeconomic status, education level, and previous disaster experience could enrich the understanding of the determinants of preparedness among older adults.

5 Conclusion

The results of this study underscore the critical need for disaster preparedness initiatives tailored specifically to the elderly population. Data collected from 25 older adults living around UPN "Veteran" Jawa Timur revealed that a significant majority (92%) were categorized as not healthy and not resilient in the face of disasters, highlighting considerable gaps in both health status and preparedness. Only a small proportion (8%) met the criteria for being healthy and resilient. These findings emphasize the importance of targeted interventions that promote health literacy, technological readiness, and disaster response capacity among older adults. To address these gaps, the URGENSI platform was developed as a comprehensive, elderly-friendly digital tool that integrates assessment, education, and consultation services. Key components such as the KESTANA and KITANA assessments and educational modules help users evaluate their resilience, improve their health practices, and prepare essential disaster kits.

Moreover, the platform's disaster-related health consultation service ensures accessible support for medical and emergency-related concerns.

User satisfaction evaluations showed overwhelmingly positive results. Across four measured aspects like content quality, ease of use, interface and visual design, and perceived usefulness, 100% of elderly respondents gave the highest satisfaction rating (score of 4). This indicates that the platform was perceived as highly accessible, relevant, and beneficial to its intended users. In conclusion, URGENSI not only addresses an urgent need among elderly communities but also demonstrates strong potential as an effective, user-approved tool for enhancing disaster preparedness and health resilience.

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