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Assessing Frailty and Earthquake Preparedness Among Geriatric Patients in an Emergency Care Setting: A Cross-Sectional Study in 2 Tertiary Hospitals in Istanbul

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Original Research

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Abstract

Objectives: The overall objective of this study is to shed light on the disaster preparedness status of geriatric patients visiting tertiary hospitals in Istanbul while assessing the relationship between frailty scores, self-efficacy, and independence among geriatric patients.

Methods: This prospective cross-sectional study was conducted in the Emergency Medicine Departments of 2 tertiary centers in Istanbul. In the survey, health and frailty status, demographics, and earthquake preparedness and planning were assessed. The Clinical Frailty Scale (CFS), Tilburg Frailty Indicator (TFI), and PRISMA-7 score were administered. Contingency tables were constructed to examine the associations between frailty categories and categorical outcomes related to disaster preparedness, self-efficacy, and independence.

Results: A small portion (5.4%) of patients had received earthquake preparedness training. Regarding emergency preparedness, 32.4% had easy access to a list of emergency contacts, and 32.1% knew the location of the emergency kit. A relationship was found between the presence of an earthquake preparedness kit and the CFS and TFI ($P<0.005$). All the self-efficacy and independence parameters needed during disasters were found to be significantly higher among frailer patients ($P<0.005$).

Conclusions: Inadequate disaster preparedness, characterized by low self-efficacy and high external dependence, are influenced by frailty. Enhancing disaster preparedness requires identifying and supporting frail individuals.

Population aging is a global issue affecting both developed and developing countries. The prevalence of older adults is expected to increase significantly by 2050. Currently, approximately 8.5% of the global population is 65 years or older, and this figure is projected to rise to an estimated 16.7% by 2050. This demographic shift highlights the growing importance of addressing health issues related to aging, including frailty and its associated risks.[1] In Türkiye, the percentage of people aged 65 and over rose from 3.9% in 1935 to 9.7% in 2021, with projections reaching 25.6% by 2080.[2]

Delivering health care services to vulnerable populations during and after large-scale disasters is challenging, as these groups are often overlooked in emergency preparedness plans.[3] A study highlighted the limited consideration given to the needs of vulnerable populations, such as frail patients, children, pregnant women, and refugees in disaster response efforts. The Kahramanmaraş earthquake in 2023, which caused massive destruction, injuries, and displacement, underscored these issues.[4]

The need to assess and quantify vulnerability is essential for understanding the factors that transform hazards into disasters. While early studies emphasized human responses to hazards, contemporary research has developed more integrative frameworks to address the multifaceted nature of vulnerability.[5]

Preparedness plays a crucial role in mitigating the effects of disasters on older adults by ensuring their specific needs are addressed before, during, and after catastrophic events. Recognizing the unique vulnerabilities of older adults allows for the development of tailored disaster response plans. Preparedness also involves addressing both the social and medical needs of older adults.[6] Assessing the capacity of older adults to respond to emergencies is another important aspect of preparedness, as quick capacity assessments can help determine their ability to evacuate or make decisions, enabling timely interventions.[7]

Individuals with greater independence may exhibit reduced vulnerability during disasters, as they are more capable of self-evacuation and managing extended periods without external support.[8] In contrast, dependent individuals are at higher risk due to limited access to caregivers and essential medical equipment, which can lead to preventable health complications.[9] Additionally, ensuring continuity of care and the availability of medical supplies for these individuals presents significant logistical challenges, particularly in the absence of routine caregivers.

General self-efficacy refers to an individual's confidence in their ability to manage a wide array of stressful or challenging situations. It is linked to task-specific self-efficacy, health-related behaviors, psychological well-being, and coping mechanisms.[10] This is particularly critical for protecting the health and coping mechanisms of elderly frail patients during disasters where the health care system suffers significant damage.[11] These differences highlight the need for tailored disaster preparedness plans that address the diverse levels of self-efficacy and independence among older adults.

Together, low self-efficacy and high external dependence create significant barriers to disaster preparedness and increase vulnerability, as such individuals may be less capable of self-sustaining actions and more reliant on external aid.[12] In this study, frailty was assessed in a population of geriatric patients presenting to 2 emergency departments in Istanbul, Türkiye using validated frailty scores. The relationship between frailty and self-efficacy, independence, and fundamental aspects of earthquake disaster preparedness was subsequently evaluated. In this study it is hypothesized that frail patients are less equipped for disaster preparedness due to their extensive medical needs, including medications, wheelchairs, hearing aids, etc.

The overall objective of this study is to shed light on the disaster preparedness status of geriatric patients seeking emergency care at the Prof Dr. Suleyman Yalçın City Hospital and Sisli Etfal Training and Research Hospital in Istanbul by assessing the relationship between frailty scores and self-efficacy, independence, and relevant preparedness parameters. The data obtained from the study will provide guidance to health care providers and public sector managers in Türkiye.

Methods

This cross-sectional study was conducted in the Emergency Medicine Departments of Prof. Dr. Süleyman Yalçın and Sisli Etfal State Hospital. Data collection took place over 3 months, beginning in July 2024. Data were collected through the administration of a questionnaire including frailty assessments during emergency department visits. Ethical considerations were upheld throughout the study, and informed consent was obtained from all participants.

The research adhered to international, national, and local regulations, as well as relevant medical codes, such as the Declaration of Helsinki. Approval for involving human subjects in research was obtained from the Ethics Committee of Bezmi Alem University (EC) number 2024/311. Participant confidentiality and anonymity were strictly maintained, and the approval letter is included as an appendix.

Patient Sampling

A post-hoc power analysis indicated that with 294 participants, the study had over 90% power to detect small-to-moderate effect sizes in both chi-square and Mann-Whitney *U* tests, confirming adequate statistical power. The study was conducted in 2 different hospital settings. The inclusion criteria comprised individuals aged 65 years and above who visited the emergency department between 9:00 a.m.-5:00 p.m., and who were triaged as T3 or T4 according to the Manchester Triage System.[13] The Manchester Triage System classifies patients into 5 urgency levels based on the severity of their condition and the maximum acceptable waiting time. T1 refers to patients needing immediate, life-saving treatment and must be seen without any delay (within 0 minutes). T2 includes very urgent cases that require medical attention within 10 minutes. T3 represents urgent cases that should be evaluated within 60 minutes. T4 includes standard cases where the patient should be seen within 120 minutes. Lastly, T5 refers to non-urgent conditions that can safely wait up to 240 minutes before being assessed. Patients in observation wards of the emergency department were also included, while exclusion criteria involved conditions requiring urgent medical intervention, severe acute distress, speech impairments, and dementia. Participation in the survey was voluntary, with informed consent obtained from all participants before survey completion.

Disaster Preparedness Survey

The survey instrument was developed by reviewing numerous articles that assessed disaster preparedness levels among various populations, including studies on the daily life activities of older adults that would be needed during and after disasters, household preparedness, and plans to access health care services in disaster settings.[6,14-17] Items from several previously validated tools and qualitative frameworks that focused on disaster preparedness among individuals with disabilities and older adults was adapted to develop the survey instrument in this study. Specifically, constructs related to disability status, functional limitations, and preparedness-related behaviors based on a nationally representative survey of older adults in the US, including preparedness indicators, barriers to evacuation, and self-sufficiency factors, were incorparated.[6] Additionally, items from the LIPI/UNESCO (2006) questionnaire, which was previously used to evaluate emergency response planning among visually impaired populations and assess individualized risk perceptions and preparedness strategies, was also adapted.[14] Risk perception dimensions such as perceived threat to life and perceived damage to property were informed by methodologies employed in earthquake vulnerability research among individuals with physical disabilities.[16] Additionally, by reviewing qualitative studies that employed open-ended questions to explore the perceptions and experiences of individuals with disabilities regarding emergency preparedness, the development of the closed-ended items in the final survey instrument was informed.[17] It consisted of 5 sections covering demographic information, earthquake preparedness, medical conditions, independence, and self-efficacy. The demographics section collected essential background information, including participants' age, gender, occupation, income level, homeownership status, and educational attainment. The preparedness section focused on assessing basic aspects of participants' earthquake preparedness, including the contents of their emergency kits, prior experiences with emergency planning, and their level of interest in disaster preparedness. The medical information section gathered details on participants' comorbidities, risk of falls, frailty, usage of medical equipment, dependency on oxygen, and medical requirements during evacuation. Medical equipment refers to assistive devices such as eyeglasses, hearing

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aids, wheelchairs, walking frames, or canes, which are often essential for daily functioning. Medications include prescribed drugs used to manage chronic conditions such as hypertension, diabetes, heart failure, and respiratory diseases. Medical supplies cover consumable items or tools needed for disease monitoring or treatment, such as glucometer kits, insulin syringes, oxygen cylinders, or nebulizer sets. The independence section evaluated participants' ability to live alone, their access to transportation, and their capacity to perform daily activities independently. Finally, the self-efficacy section measured participants' confidence in managing various aspects of an emergency, including property protection, securing financial resources, maintaining adequate food and water supplies, and coping with emotional stress. The survey was administered in Turkish and translated into English for publication purposes. The survey was administered to patients by the Principal Investigator, with the assistance of 6 trained medical students. The survey was conducted face-to-face, with questions asked to the patients, their relatives, or caregivers, and the printed surveys filled in by the researchers (Appendix 1).

Frailty Assessments

Clinical Frailty Scale

The Clinical Frailty Scale (CFS) is a tool used to assess frailty, primarily in older adults, by evaluating their overall health status, function, and ability to conduct activities of daily living. It employs a scale ranging from 1-9, with corresponding images and descriptions to grade the severity of frailty.[18] In this study, patients scoring 5 or more points on the CFS were classified as frail.

Tilburg Frailty Indicator

The Tilburg Frailty Indicator (TFI) is a comprehensive tool designed to assess frailty by considering multiple dimensions of an individual's health, including physical, psychological, and social domains. The TFI consists of 15 self-reported questions about physical (8 items), psychological (4 items), and social (3 items) domains of frailty. All of them are yes/no questions. The total score ranges between 0-15 (0 or 1 point for each item) and higher scores indicate more severe frailty. The authors of the original TFI recommend categorization of the subjects as frail if their total score is 5 or higher.[19]

PRISMA-7 Scale

The PRISMA-7 Scale is a questionnaire consisting of 7 dichotomous items, each assigned a score of 0 or 1 point. A total score ≥3 of 7 is regarded as indicative of frailty. The tool assesses whether the individual is older than 85 years, male, has health issues that limit activities, requires the support of another person, has health conditions necessitating staying at home, relies on social support, or uses assistive devices such as a cane, walker, or wheelchair. The tool is validated in Turkish.[20]

Statistical Analysis

The data were analyzed using IBM SPSS Statistics version 26 (IBM Corp., Released 2019). Descriptive statistics were computed for demographics to summarize the baseline characteristics of the study population. The patients are categorized into 3 age groups: 65-75, 75-85, and above 85. Their educational levels are classified into 4 categories: Uneducated, Primary School, Middle School-High School, and University and above. Their occupations prior to retirement are divided into 3 categories: White-collar, Blue-collar, and Unemployed. To assess differences in disaster preparedness, self-efficacy, and independence across frailty levels, chi-square tests were performed. Frailty levels were categorized as "Not Frail" and "Frail" based on the assessments derived from the 3 distinct frailty assessment tools: CFS, TFI, and PRISMA-7 Scale. The assumption of normality was assessed with the Kolmogorov-Smirnov test. The Mann-Whitney U test was employed for comparisons of non-normally distributed variables between groups. Categorical variables were compared using Pearson's chi-square test, and multiple comparisons were evaluated with the Bonferroni-corrected Z test. Results were presented as mean ± standard deviation and median (minimum–maximum) for quantitative data, and as frequency (percentage) for categorical data. A significance level of $P<0.05$ was considered statistically significant.

Results

The total number of participants invited was 384, and 294 provided informed consent and completed the questionnaire (Prof Dr. Suleyman Yalcin Goztepe City Hospital, 66.4%; Sisli Etfal Hospital, 33.6%), corresponding to a response rate of 76.6%. The analysis revealed that 34.8% of the patient population was aged 85 years or older, with 52.9% being women. Occupational history showed that 39.7% had worked in blue-collar jobs, while 40.1% had a primary school education, the most common educational level.

Based on the CFS, 43.5% of the patients were classified as frail, while 45.6% were frail according to the PRISMA-7, and 57.1% were frail based on the TFI. The CFS scores of the patients show a mean of 4.37 ± 1.88, while the PRISMA-7 Score has a mean of 2.79 ± 1.89. The patients' scores on the physical domain of the TFI are 3.3 ± 2.23, the psychological domain has a mean score of 1.47 ± 1.2, and the social domain scores show a mean of 0.71 ± 0.83.

The most common diseases were diabetes mellitus and hypertension, with prevalence rates of 22.5% and 12.7%, respectively. Frailty was strongly associated with age, with older patients (particularly those over 85 years) exhibiting higher frailty levels. For instance, for the CFS score only 14.1% of patients aged 65-75 were frail, compared to 39.4% in the 75-85 age group and 73.5% in those over 85. Frailty was also linked to educational attainment, with 71.4% of patients with no formal education being frail, compared to only 38% of patients with university-level education or higher according to the PRISMA-7 score.

Table 1 gives the detailed parameters of the survey and Table 2 shows the comparisons of demographic characteristics with frailty scores.

Earthquake Preparedness

A small portion (5.4%) of the patients had received earthquake preparedness training, and 22.8% reported having an emergency kit, with flashlights being the most common item. Regarding emergency preparedness, 32.4% had easy access to a list of emergency contacts, and 32.1% of households knew the location of their emergency kit.

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Table 1. Descriptive statistics of demographic and clinical characteristics of patients

	n = 294	
Age		
65–75	92 (31.4)	
75–85	100 (33.8)	
85 +	102 (34.8)	
Gender		
Male	138 (47.1)	
Female	155 (52.9)	
Comorbidities*		
Diabetes mellitus	128 (22.5)	
Hypertension	73 (12.9)	
Myocardial infarction	69 (12.1)	
Dementia	62 (10.4)	
Congestive heart failure	60 (10.6)	
Peptic ulcer	37 (6.5)	
Stroke or TIA	36 (6.4)	
Moderate or severe COPD	34 (6.1)	
Solid tumor	25 (4.4)	
Peripheral vascular disease	17 (3)	
Chronic kidney disease	11 (2)	
Severe liver disease	8 (1.4)	
Hematologic Malignancies	3 (0.6)	
Frailty Scores		
CFS	4.37 ± 1.88	4 (1 – 8)
PRISMA–7 Score	2.79 ± 1.89	2 (0 – 7)
Tillsburg Physical	3.3 ± 2.23	3 (1 – 8)
Tillsburg Psychological	1.47 ± 1.2	1 (0 – 4)
Tillsburg Social	0.71 ± 0.83	1 (0 – 3)

Frailty and preparedness

A relationship was found between the presence of an earthquake preparedness kit and the CFS and TFI scores (P<0.005), with frailer patients being more frequently associated with possessing the kit, whereas no relationship was found with the PRISMA-7 score (P<0.005). Additionally, no relationship was found between any frailty scores and the materials in the earthquake kit and earthquake preparedness training (P>0.005). Table 3 gives details about the preparedness parameters.

Independence and frailty

A statistically significant difference was observed in the distribution of durations patients could remain alone without the assistance of a caregiver, helper, or family member, according to their CFS, PRISMA-7, or TFI assessment (P<0.001). When the ability of patients to perform daily activities independently was examined, a statistically significant difference was found between the scores for activities such as dressing, eating, walking within the house, using the toilet, hygiene, clothing and grocery shopping, household chores, paying bills and fulfilling other financial obligations, cooking, taking medications, using the phone, and transportation based on the clinical frailty status of the patients (P<0.001). It was observed that frail patients had lower scores of external independences, indicating a reduced ability to perform daily activities independently. A statistically significant difference was also found in the same activities based on the PRISMA-7 and TFI assessment (P<0.001).

Self-efficacy and frailty

A statistically significant difference was found between the scores for property and self-protection, acquiring financial resources, obtaining food and water, staying with relatives, coping with personal loss, managing emerging emotions, and returning to daily routines based on CFS (P<0.001). A statistically significant difference was also found in coping with emergencies based on the PRISMA-7 score (P<0.001), with frail patients showing lower self-efficacy scores in these areas. Similarly, the TFI showed a statistically significant difference in the patients' ability to cope with emergencies (P<0.001). Tables 4 and 5 show the comparison between frailty with independence and self-efficacy.

Limitations

The study population was limited to patients presenting to the emergency departments of 2 tertiary hospitals in Istanbul, which may not reflect the preparedness of elderly individuals in other regions or those who do not seek emergency care. Additionally, the study may be subject to selection bias, as it does not include healthy older adults who did not require emergency services, potentially limiting the generalizability of the findings to the broader elderly population. However, each hospital involved in the study is located on a distinct side of Istanbul and has over 1000 admissions daily. The 3-month data collection period may not capture seasonal variations or broader patterns in preparedness behavior. Because this study was conducted after the 2023 Türkiye–Syria earthquakes, it shows a period when society is more sensitive in terms of earthquake preparation.

Another limitation is the lack of detailed data on participants' type of residence (e.g., private home vs. assisted living facility), which may influence disaster preparedness behaviors and available support systems.

In this study, self-efficacy and independence evaluation parameters that were not validated but were derived from previous evidence from the literature were utilized. Therefore, the results may not have comprehensively addressed these 2 assessments. However, because the parameters that are frequently required during disasters were used, it is believed that exploring the relationship between frailty and these factors serves the purpose of this study.

This study did not explicitly differentiate individual from household-level preparedness, which may limit interpretation, as older adults' disaster readiness often depends on household dynamics. Distinguishing these levels is essential to identify specific vulnerabilities, particularly among those living alone, and to guide targeted interventions for at-risk elderly populations.

Discussion

The present study aimed to evaluate the relationship between frailty, independence, self-efficacy, and disaster preparedness among geriatric patients presenting to 2 tertiary emergency

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Table 2. Distribution of frailty by gender, age groups, occupational groups, and educational status

	Clinical Frailty		Prisma-7		Tillsburg				
	Not Frail (*n* = 166)	Frail (*n* = 128)	Not Frail (*n* = 160)	Frail (*n* = 134)	Not Frail (*n* = 126)	Frail (*n* = 168)	p1	p2	p3
Gender									
Male	84 (60.9)	54(39.1)	64 (46.4)	74 (53.6)[a]	64 (46.4)	74 (53.6)	0.138	**0.011**	0.225
Woman	82 (52.3)	74(47.7)	96 (61.3)	60 (38.7)[b]	62 (39.4)	94 (60.6)			
Occupation									
Unemployed	51 (49)	53 (51)	61 (58.7)	43 (41.3)	35 (33.7)	69 (66.3)	0.135	0.061	0.051
Blue collar	67 (57.8)	49 (42.2)	53 (45.7)	63 (54.3)	53 (45.7)	63 (54.3)			
White collar	46 (63.9)	26 (36.1)	44 (61.1)	28 (38.9)	37 (51.4)	35 (48.6)			
Education status									
Uneducated	6 (28.6)	15 (71.4)[a]	6 (28.6)	15 (71.4)	6 (28.6)	15 (71.4)[ab]	**0.013**	0.074	**0.006**
Primary school	64 (54.2)	54 (45.8)[ab]	66 (55.9)	52 (44.1)	40 (33.9)	78 (66.1)[b]			
Middle School-High School	61 (58.1)	44 (41.9)[ab]	57 (54.3)	48 (45.7)	50 (47.6)	55 (52.4)[ab]			
University and above	35 (70)	15 (30)[b]	31 (62)	19 (38)	30 (60)	20 (40)[a]			

p: Pearson chi-square test, p 1: comparison of clinical frailty according to demographic characteristics,
p 2: comparison of Prisma 7 frailty according to demographic characteristics,
p 3: comparison of Tillsburg frailty according to demographic characteristics,
a-c: no difference between demographic groups with the same letter (*Z* test with Bonferroni correction), *n* (row %)

departments in Istanbul. This study demonstrated that disaster preparedness was generally inadequate among this population, with only a small proportion of older adults having received earthquake preparedness training or possessing comprehensive emergency kits. Notably, higher levels of frailty were associated with greater dependence and lower self-efficacy, both of which are critical determinants of disaster readiness.

This study revealed that, despite the unprecedented scale and nationwide impact of the 2023 Türkiye earthquake, disaster preparedness among older adults remains critically insufficient. Even in the period shortly after this major catastrophe, a substantial proportion of elderly individuals lacked adequate emergency planning and resources. In contrast, previous research from Eastern Anatolia reported that individuals with prior earthquake experience, as well as those who owned homes or were married, demonstrated significantly higher levels of preparedness than those without such experience or ownership.[21] This discrepancy highlights that, although large-scale disasters may increase general societal awareness, older adults do not necessarily translate this awareness into actionable preparedness. These findings emphasize the importance of developing targeted interventions that address the unique barriers faced by the geriatric population, such as frailty, dependence, and low self-efficacy, to ensure that increased awareness following major disasters is effectively converted into practical preparedness measures within this vulnerable group.

Frail patients possess more emergency kits, but the materials included in these kits appear to be inadequate or unsuitable for use during a disaster. In disaster situations like earthquakes, security forces, health care teams, and aid organizations may face delays in reaching individuals, leading to safety deficiencies, health problems, and difficulties in accessing clean water and food.[22] Although older individuals have a more urgent need for necessities in disasters, they tend to place greater emphasis on acquiring specific health items like, wheelchairs, and eyeglasses. For instance, Fernandez et al. discuss the vulnerabilities of frail elderly individuals in disaster situations, emphasizing the importance of addressing their specific needs, including access to assistive devices.[23] In such cases, individuals' ability to protect themselves, find financial resources, and obtain food and water becomes more crucial.

The conceptual framework depicted in the diagram illustrates the proposed impact of frailty on disaster resilience, emphasizing its interconnected effects on self-inefficacy, dependence, and mortality/morbidity (Figure 1).

In this study, it is observed that a significant portion of the patients required equipment such as wheelchairs (50, 6.9%), oxygen (49, 6.7%), and hearing aids (42, 5.8%), which are not easily accessible in a short period during a disaster. Additionally, the potential problems with the use of these devices because many of them rely on electricity was foreseen. In a study conducted in Thailand, the main findings regarding the attitudes of elderly patients towards disaster preparedness indicated a low level of knowledge about disaster preparedness, despite a prominent level of reported participation in disaster preparedness courses and awareness of disaster risks in their community. Specifically, while many elderly emergency department patients reported having a medication supply for disaster situations, a considerable number lacked comprehensive disaster plans. Additionally, a large portion of the elderly patients did not know the emergency telephone number for ambulance services, highlighting gaps in their preparedness knowledge and resources.[24] Another study from the United States of America identified several specific needs for older adults regarding disaster preparedness. A minority of older adults had a disaster plan in place. Many respondents indicated they would require medications, expressed the need for help with their self-efficacy and independence if evacuated, and lacked ready access to lists of their medical problems, medications, and emergency contacts, which could hinder effective care during a disaster.[6]

The recommendations include placing easily accessible medical equipment, such as medications and other essential medical supplies for the elderly, in containers stationed in earthquake-prone

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Table 3. Descriptive statistics of preparedness parameters of participants

	n = 294
Who do you live with?	
Caregiver	23 (7.8)
Family	138 (46.9)
Spouse	91 (31)
With partner and caregiver	5 (1.7)
Alone	37 (12.6)
Receiving any training or information about earthquakes	
No	278 (94.6)
Yes	16 (5.4)
Do you have an earthquake preparedness kit?	
No	227 (77.2)
Yes	67 (22.8)
Do you keep spare batteries at home?	
No	107 (40.5)
Yes	157 (59.5)
Do you know basic first aid procedures?	
No	233 (80.3)
Yes	57 (19.7)
Do you know the location of your home's fuse box, water valve and gas valve?	
No	55 (18.7)
Yes	239 (81.3)
Do the other residents know how to turn off the electricity, water and gas in an emergency?	
No	42 (14.7)
Yes	244 (85.3)
Do you have a wrench or pliers you can use to close the gas valve?	
No	63 (21.8)
Yes	226 (78.2)
Are you careful not to place heavy items on high places or shelves?	
No	123 (41.8)
Yes	171 (58.2)
Have you secured heavy items and furniture to the floor or wall (e.g. kitchen shelves and bookcases)?	
No	197 (67.2)
Yes	96 (32.8)
If your answer is yes, which of the following does it include?*	
Enough water for 3 days	55 (9.9)
Enough food for 3 days	49 (8.8)
Emergency numbers	19 (3.4)
Antibacterial gel or wipes	23 (4.1)
Blanket	42 (7.5)
Working radio	30 (5.4)
Extra house and car keys	4 (0.7)
Non-electric can opener or utility knife	12 (2.2)
Torch	64 (11.5)
First aid kit	42 (7.5)
One change of clothes per person	30 (5.4)
Personal hygiene materials	35 (6.3)
Cash or check	28 (5)
Lunch box	10 (1.8)
Toilet paper	39 (7)
Spare batteries	32 (5.7)
Essential medicines	43 (7.7)
Have you ever had an emergency plan that you could implement in case of an earthquake?*	
I had a phone for emergency calls	73 (17.8)
I knew where I could go to shelter in case of emergency.	64 (15.6)
I knew how to contact the organizations I needed to contact in an emergency	52 (12.7)
I knew the number of a relative I could call in case of emergency.	104 (25.4)
Medical drug planning	40 (9.8)
None	73 (17.9)
Can you easily access any of the following?*	
List of emergency contacts (family, friends, caregivers)	188 (32.4)
List of doctors you see regularly	77 (13.3)
A list of medications you take every day.	179 (30.9)
Your medical history and list of chronic conditions	136 (23.4)
Do you use any medical equipment that requires electricity, such as CPAP, motorized wheelchair, etc.?	
No	239 (83.6)
Yes	47 (16.4)
If you had to evacuate to a shelter, which of the following would you need to have with you?*	
Medicines	241 (33.1)
Glasses	159 (21.8)
Glucometer	90 (12.4)
Wheelchair	50 (6.9)
Oxygen	49 (6.7)
Diaper	48 (6.6)
Hearing aid	42 (5.8)
Walker	36 (5)
Leg or arm splint/support equipment	5 (0.7)
Materials required for tracheostomy	4 (0.5)
Nebulizer	1 (0.1)
Materials required for stoma	1 (0.1)
None	2 (0.3)

*Multiple responses, *n* (%).

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Table 4. Examination of independence skills of patients according to their frailty status

	CFS		Prisma 7		Tillsburg				
	− (*n*=166)	+ (*n*=128)	− (*n*=160)	+(*n*=134)	− (*n*=126)	+(*n*=168)	CFS p1	Prisma 7 p2	Tillsburg p3
How long can you stay at home alone? *									
1 week	18 (10.5) [a]	10 (7.4) [a]	21 (12.7) [a]	7 (4.9) [b]	16 (12.1) [a]	12 (6.9) [b]	**< 0.001x**	**< 0.001x**	**< 0.001x**
Less than 2 days	10 (5.8) [a]	14 (10.4) [a]	11 (6.7) [a]	13 (9.2) [a]	13 (9.8) [a]	11 (6.3) [b]			
24 hours or less	9 (5.2) [a]	27 (20) [b]	8 (4.8) [a]	28 (19.7) [b]	11 (8.3) [a]	25 (14.3) [b]			
6 hours or less	8 (4.7) [a]	28 (20.7) [b]	6 (3.6) [a]	30 (21.1) [b]	7 (5.3) [a]	29 (16.6) [a]			
I do not need help at home	120 (69.8) [a]	15 (11.1) [b]	113 (68.5) [a]	22 (15.5) [b]	82 (62.1) [a]	53 (30.3) [a]			
I cannot be alone.	7 (4.1) [a]	41 (30.4) [b]	6 (3.6) [a]	42 (29.6) [b]	3 (2.3) [a]	45 (25.7) [a]			
Driving a car									
No	94 (56.6)	121 (94.5)	97 (60.6)	118 (88.1)	73 (57.9)	142 (84.5)	**< 0.001x**	**< 0.001x**	**< 0.001x**
Yes	72 (43.4)	7 (5.5)	63 (39.4)	16 (11.9)	53 (42.1)	26 (15.5)			
Dressing	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	3.5 (1 – 5)	5 (2 – 5)	4 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Eating	5 (1 – 5)	4 (1 – 5)	5 (1 – 5); 173.68	5 (1 – 5); 98.56	5 (4 – 5); 179.61	5 (1 – 5); 122.74	**< 0.001m**	**< 0.001m**	**< 0.001m**
Walking in the house	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	3 (1 – 5)	5 (3 – 5)	4 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Ability to go to the toilet	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	3 (1 – 5)	5 (2 – 5)	4 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Hygiene	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	3 (1 – 5)	5 (2 – 5)	4 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Clothing and grocery shopping	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Housework	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Paying bills	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Cooking	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Being able to take your medications	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	4 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Using the phone	5 (1 – 5)	3 (1 – 5)	5 (1 – 5)	3 (1 – 5)	5 (2 – 5)	3 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
Transport	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	1 (1 – 5)	5 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**

x: Pearson chi-square test, m: Mann Whitney *U* test, ab: no difference between frailty groups with the same letter (Bonferroni corrected *Z* test), *n* (column %), median (min.- max.); SO, SO: Rank mean, CFS: Clinical Frailty Score.

Table 5. Examination of self-efficacy skills of patients according to their frailty status

	CFS		Prisma 7		Tillsburg				
	– (*n* = 166)	+ (*n* = 128)	– (*n* = 160)	+(*n* = 134)	– (*n* = 126)	+(*n* = 168)	CFS p1	Prisma 7 p2	Tillsburg p3
Self-Efficacy (I can ..... in emergencies)									
protect myself and my property	4 (1 – 5)	1 (1 – 5)	4 (1 – 5)	1 (1 – 5)	4 (1 – 5)	1 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
obtain financial resources	3 (1 – 5)	1 (1 – 5)	3 (1 – 5)	1 (1 – 5)	3 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
provide food and water	4 (1 – 5)	2 (1 – 5)	4 (1 – 5)	2 (1 – 5)	4 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
stay with my relatives.	5 (1 – 5)	4 (1 – 5)	5 (1 – 5); 152.4	5 (1 – 5); 139.54	5 (1 – 5)	4 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
cope with the personal losses caused	3 (1 – 5)	1.5 (1 – 5)	3 (1 – 5)	2 (1 – 5)	3 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
deal with the emotions that arise.	3 (1 – 5)	2 (1 – 5)	3 (1 – 5)	2 (1 – 5)	3 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**
return to my normal daily routine after	3 (1 – 5)	2 (1 – 5)	3 (1 – 5)	2 (1 – 5)	3 (1 – 5)	2 (1 – 5)	**< 0.001m**	**< 0.001m**	**< 0.001m**

x: Pearson chi-square test, m: Mann Whitney *U* test, ab: no difference between frailty groups with the same letter (Bonferroni corrected *Z* test), *n* (column %), median (min.- max.); SO, SO: Rank mean, CFS: Clinical Frailty Score.

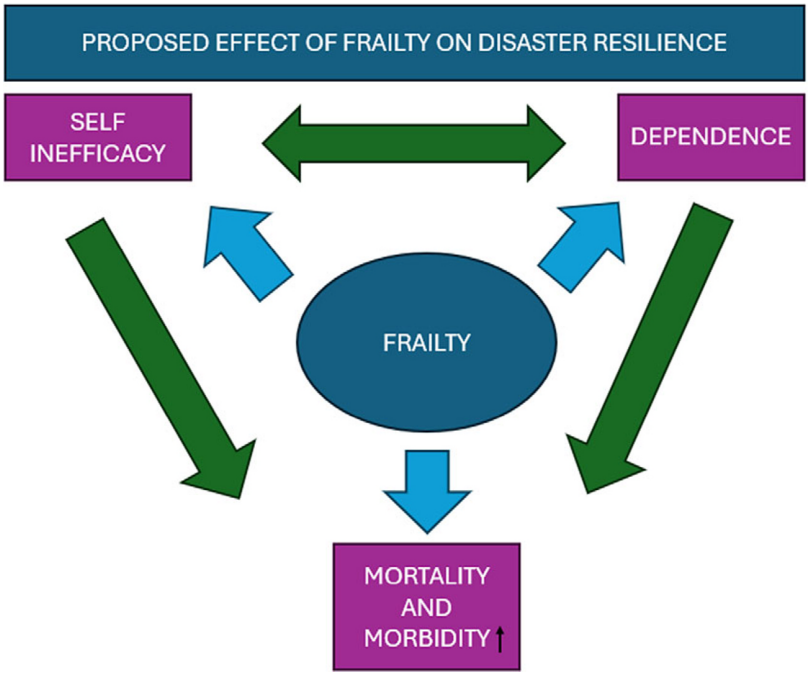

Figure 1. Proposed effect of frailty on disaster resilience.

areas within the city. These containers should be in places that are secure and made from durable materials to withstand potential damage during a disaster. Additionally, it is essential to determine which hospitals individuals should go to, strengthen shelters, ensure access to generators, and, if necessary, provide spare equipment to local governance units, such as Muhtar's offices,[a] to facilitate their distribution. Furthermore, it was found that the prevalence of conditions such as diabetes, heart failure, and COPD, which can rapidly decompensate without medication, was remarkably high among the patients in this study. Because backup plans for the daily care of these individuals cannot be adequately established at home, the recommendation is collaborating with pharmacies and medical supply depots to implement preventive measures. Also, social teams by local authorities might be formed to meet the needs of the old patients.

In the context of disaster, self-efficacy denotes an individual's confidence in one's own ability to carry out specific operations to respond effectively during a disaster.[25] Self-efficacy enhances the ability to make quick and effective decisions during emergencies. This is especially important for elderly individuals who may face physical or cognitive challenges. Research shows that individuals with greater self-efficacy are more decisive and confident in high-stress situations.[26(pp163-196)] Independency is generally defined using the concepts of ADL (Activities of Daily Living) and IADL (Instrumental Activities of Daily Living), which represent an individual's ability to perform daily tasks and manage more complex activities.[27]

In this study, disaster-related parameters of independence and self-efficacy were analyzed through a literature review. According

[a]A "Muhtar" is the head of village or neighborhood administration within the legal entity of a village or municipal boundaries.

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to the findings of this study, there is a significant association between dependency, self-efficacy, and frailty. It is hypothesized that independent individuals may be less vulnerable during disasters due to their ability to evacuate more quickly and manage on their own for prolonged durations in emergency situations. Conversely, dependent individuals are likely to face challenges, such as limited access to caregivers and medical equipment, increasing the risk of preventable morbidity and mortality. Moreover, providing medical equipment and ensuring continued care for these individuals in such scenarios would be logistically challenging due to the potential loss of routine caregivers or medical supplies. Therefore, health policymakers should prioritize identifying dependent individuals through frailty screenings and implementing measures to protect them from potential complications in disaster situations. These measures could include physical medicine and rehabilitation interventions to mitigate disability when possible, increasing home care services through collaboration with family physicians. Also in this study, patients reported that they were confident in staying with their relatives during an emergency, but the least confident in returning to their daily routine afterwards, which highlights that earthquake planning among the participants of this study often relied on social support, likely because most elderly individuals lived with their families; therefore, considering the possible loss of families in major catastrophes and establishing support systems, such as "shadow families," to assist dependent individuals during emergencies might be feasible.

Self-efficacy and independence are critical components of disaster preparedness, as they represent modifiable factors that can be addressed through targeted interventions. For example, if an individual is unable to sustain themselves at home for 3 days, the underlying causes can be examined and evaluated by public health professionals. Similarly, if a person is unable to operate a vehicle, a tailored transportation plan can be developed to address this limitation. However, identifying such individual needs is both complex and lacks standardization. To address this challenge, the development of a preliminary screening tool is essential. It is proposed that such a tool should incorporate vulnerability assessments to identify individuals who lack key disaster-related competencies, such as self-efficacy and independence. This screening would enable the identification of at-risk populations and allow for the implementation of case-based interventions aimed at enhancing their preparedness and resilience in the face of disasters.

In this study, frailty was assessed using 3 distinct scales: the CFS, the PRISMA-7, and the TFI. Results indicated that frailty was detected in 43%-57% of the participants, depending on the test used. All frailty scores were found to be strongly correlated with increased dependence and decreased self-efficacy parameters. Frailty has significant implications for the planning and delivery of health and social care services, particularly as the population ages. The main health risks associated with frailty in older adults include increased disability, which is linked to a higher likelihood of impaired daily functioning and reduced quality of life, and hospitalization.[28] The pre-established parameters of policymaking prior to disasters are critical for effective disaster response, particularly as vulnerable populations, such as frail patients, already face challenges in accessing medical care under normal conditions. During disasters, these challenges are exacerbated, as the health care delivery chains are likely to be disrupted, increasing the risk of mortality and morbidity. This is especially true in the context of earthquakes, where both infrastructure and health care systems are expected to be severely compromised.[29]

Upon examining these results, it can be concluded that administering an appropriate frailty assessment allows for an effective evaluation of patients' levels of self-efficacy and independence, as well as utilization of frailty assessments to screen the geriatric population for disaster preparedness interventions. The TFI allows separate physiological and psychological assessments and provides a more detailed evaluation. When compared with the Mini-Mental State Examination (MMSE), the Hospital Anxiety and Depression Scale (HADS), and the Katz Index of Independence in ADLs, the TFI showed high correlation.[30] The PRISMA-7 scale is a simpler, shorter survey that can be easily administered. Unlike the CFS, it does not require health care professionals for application and can be used in social organizations' screening programs. In telemedicine applications, simpler tests like the PRISMA-7 scale have shown positive effects in monitoring patients with conditions like Parkinson's disease.[31] Depending on the context, including the time, setting, available personnel, and agencies involved in disaster response, appropriate frailty scores can be utilized to assess the vulnerabilities of the target elderly population effectively.

Policymakers must consider frailty in their planning, ensuring health systems are prepared to manage the complexities of aging populations, including promoting healthy aging and supporting frail individuals. Interventions which directly focus on elderly patients' frailty status, such as medical equipment support, physiotherapy practices, and extended family medicine follow-ups, as well as educational programs for those providing social support, would improve the disaster vulnerability of these groups. TFI and PRISMA-7 for use by family physicians who follow older adults in the community could be instrumental in systematically identifying those at heightened risk during disasters. By implementing these validated frailty measures in primary care, it becomes possible to proactively map vulnerable subgroups within the elderly population and prioritize their needs within disaster preparedness planning. Moreover, using these scores enables the development of tailored educational programs for both frail individuals and their caregivers, ensuring that training content addresses specific functional, medical, and psychosocial challenges these groups may face during emergencies. Such targeted preparedness initiatives may include specialized disaster response drills, individualized evacuation protocols, and accessible informational resources, all of which can enhance resilience and reduce morbidity and mortality among frail older adults. Therefore, integrating frailty screening into routine primary care represents a feasible and effective policy for strengthening disaster risk reduction strategies for aging populations.

Future research can look at why preparedness is not adequate in frail patients, for instance, through an examination of the roles played by external dependency, socioeconomic factors, and self-efficacy in undermining frail persons' preparedness. Given that frailty in the current study is defined by reduced self-efficacy and increased dependency, future research should address psychological barriers such as fear, anxiety, perceptions of social isolation, beliefs about having a limited lifespan, and religious convictions, all of which may hinder frail individuals from participating in preparedness interventions.

Conclusion

Overall, the patients included in this study were found to be insufficient in terms of disaster planning and preparedness. Their low self-efficacy, combined with high external dependence, both of which can be determined by frailty, suggests a heightened risk of

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preventable mortality or morbidity during and after major disasters such as earthquakes. In this context, identifying and supporting the frail population is crucial for effective disaster preparedness. National awareness campaigns, coupled with the proactive involvement of family medicine screening programs, might play a pivotal role in strengthening this process. While health care professionals can utilize clinical frailty scores, the PRISMA-7 scale offers a simpler alternative for use by non-health care organizations. For more comprehensive evaluations, the Tilburg Frailty Indicator serves as a robust tool.

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/dmp.2025.10158.

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