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Flood disaster experiences of elderly individuals living in the western black sea region of Türkiye: a phenomenological study

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Abstract

The increase in the elderly population, the issue of flood risk management and flood preparedness stands out as an important issue that needs special attention. This study aimed to evaluate the feelings and thoughts of the elderly individuals who experienced floods in Türkiye before, during, and after the floods, and to reveal how they were affected, their vulnerability, and coping capacities. In this regard, phenomenological design, one of the qualitative research methods, was used in the study. Purposive sampling techniques were used for this study. A semi-structured interview form, which was prepared by the researchers by reviewing the relevant literature and taking expert opinions, was used to collect the data. The data of the study were collected between September and October 2024. The study was carried out with 14 people based on data saturation. Within the scope of the study, three themes were created. These are (theme 1) elderly people's risk knowledge and their views on the preparation process, (theme 2) vulnerabilities and coping capacities of elderly individuals during disasters, and (theme 3) post-flood needs, social network relations, and lessons learned. As a result of the analysis, it was determined that elderly individuals were aware of local disaster hazards, but despite this, the elderly did not make individual disaster preparations. It was determined that elderly individuals do not have sufficient access to early warning messages before the flood disaster occurs. During the disaster, elderly individuals were trapped in water, exhibited risky behaviors, experienced fragility during the evacuation process, and suffered material and moral losses. In the post-disaster period, elderly individuals have some basic needs such as clean water, medicine, shelter, toilets, nutrition, clothing, and health care, and their neighbors and relatives provide support in meeting these needs. The results obtained from the study may contribute to increasing the flood response capacity for elderly individuals, a vulnerable group in disasters.

Keywords Disaster, Disaster experience, Disaster policies, Elderly, Flood

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Introduction

Floods are one of the most widespread and effective types of natural hazards in the world [1], causing significant loss of life and property in the last century, causing serious economic damage, and continuing to have an impact today [2]. The Center for Research on the Epidemiology of Disaster (CRED) reported that the most common type of disaster in 2023 was flooding, with 163 incidents. The average values between 2003 and 2022 also show that flooding is the most frequent disaster [3]. Today, the increase in extreme weather events, especially with the impact of climate change, causes sudden and large-scale flood events to occur more frequently [4, 5]. This is also supported by evidence that urban areas have become more prone to flooding over the last three decades [6]. In Türkiye, where the study was carried out, 1076 flood events occurred in the previous 50 years and 795 people lost their lives as a result of these events. It was reported that these floods caused a total of 800 million dollars of economic loss [7]. When the flood disasters that occurred in Türkiye were examined, 97 people lost their lives as a result of the flood events in Bartın, Kastamonu, and Sinop provinces on August 11, 2021 [8–11]. In Düzce province, where the study data were collected, two people lost their lives and 29 people were injured in the flood disasters in 1961 [12]. In the flood disaster in Düzce in 2006, there was a serious financial loss. Seven people lost their lives in the flood in 2019 [13]. In addition, there were many flood disasters in Düzce province in 2021 [14], 2022 [15], and 2023 [16]. It was reported that many people's homes, workplaces, and farms have been damaged due to the flood disasters in Düzce [13]. Therefore, it can be stated that after earthquakes, flood disasters in Türkiye have devastating effects both economically and socially [17]. It is seen that some groups are more affected by disasters than other individuals. Examples of groups that are more affected by these disasters include the elderly, children, pregnant women, and the disabled. Elderly individuals are more affected by unusual situations, especially due to various restrictions [18–20].

The World Health Organization (WHO) considers aging an important issue due to the dramatic increase in the number and proportion of the elderly population worldwide [21]. According to the report of the United Nations Department of Economic and Social Affairs (UN-DESA), the number of people aged 65 and over, which was 258 million in 1980, increased approximately 3 times in 2022 and reached 771 million. According to population projections, it is estimated that the elderly population will reach 994 million in 2030 and 1.6 billion in 2050 [22]. Both the number and the proportion of the elderly population to the total population is increasing worldwide. In 2021, 1 out of every 10 people of the world population was aged 65 and over, while this rate is expected to reach 1 out of every 6 people by 2050 [22]. In addition, WHO states that by 2030, 1 out of every 6 people in the world will be 60 years of age or older [23]. Similar to the rest of the world, the number of the elderly population aged 65 and over in Türkiye and its proportion in the total population is gradually increasing. While the proportion of the elderly population in the total population was 8.5% in 2017, it increased to 9.9% in 2022. It is predicted that the proportion of the elderly population in the total population will be 12.9% in 2030, 22.6% in 2060, and 25.6% in 2080 [24].

Disasters do not affect all population groups at the same rate [20]. The negative impacts of disasters are concentrated on vulnerable groups [19]. Vulnerable populations are less likely to undertake self-protection actions before, during, or after disasters [25]. Pregnant women, families with children, older adults, people with disabilities, and low-income individuals, who are considered vulnerable groups, are disproportionately affected by disasters [26]. In particular, the declining physical functions of the elderly, their weakened mental capacities, and their need for someone else make them more vulnerable to disasters than young adults [18]. Considering that approximately 80–92% of elderly people have at least one chronic disease that can leave them vulnerable during a disaster [27], the negative effects of disasters on the physical and mental health of the elderly are inevitable [28–31]. It was reported that elderly females experience more post-traumatic stress disorder after disasters than males [32]. In addition, conditions such as vision and hearing loss in the elderly make them inadequate in understanding and applying safety instructions [33], and therefore elderly people are considered the most difficult group to evacuate in disasters [34, 35]. It can be stated that the loss of labor force and low-income level with advancing age pave the way for elderly people to be more exposed to the effects of disasters [36, 37]. This situation greatly affects the preparedness of the elderly against disasters, paving the way for their inability to adequately prepare for disasters [38–40]. Previous studies have revealed the vulnerability of the elderly in flood disasters. In flood disasters, mortality rates of the elderly are reported to be high [41–44] and elderly females are more vulnerable to flooding than males [45]. In addition, it was noted that flooding has negative effects on both the physical and psychological health of the elderly [46, 47]. Health problems exacerbated by disasters become a significant issue for elderly individuals. A previous study reported an increase in the rate of medication prescriptions of the elderly after the flood disaster [48]. A study aimed at investigating the health status and quality of life of the elderly after the flood disaster in China in 2011, determined a significant decrease in the health status of the elderly [49].

Physical, cognitive or social changes that occur with age increase the vulnerability of older individuals, especially in terms of mobility and preparedness capacity, to disasters such as floods [50, 51]. In a study investigating the factors affecting older adults' disaster preparedness behaviors, it was stated that older adults do not spend time or money on disaster preparation [51]. Another important issue in flood disasters, especially for the elderly, is evacuation. Evacuation planning for the elderly is necessary, taking into account the potential challenges of flood evacuation [52]. In a study aiming to determine the evacuation skills of the elderly in flood disasters with subjects using geriatric simulators, it was determined that the evacuation rate of the elderly decreased as the water depth increased and it was reported that the elderly should be safely evacuated before flooding occurs [53]. Therefore, it can be stated that preparatory training and awareness studies are essential for a successful management process in flood disasters. In a study aimed to analyze the flood preparedness of the elderly population in Thailand, it was reported that nearly three-quarters (75%) of the elderly used online applications for flood hazard management before and after the flood disaster but almost all of the participants (86%) did not participate in community education on flood preparedness and management at all [54]. Another study noted that the current level of awareness and preparedness among elderly individuals for flood disasters is low [55]. Elderly individuals have been identified as the groups most at risk in flood-prone areas [56]. In another study assessing flood risk for elderly individuals, it was noted that many counties with a high proportion of elderly populations have an older housing stock that is more prone to damage, more expensive, and more difficult to refurbish [57]. Therefore, with the increase in the elderly population, the issue of flood risk management and flood preparedness stands out as an important issue that needs special attention. In this regard, it is of great importance to examine the flood experiences of elderly individuals in-depth and to develop strategies in this context.

This study aimed to reveal the feelings and thoughts of the elderly, who are described as a vulnerable group in disasters, before, during, and after the flood, and to examine how the elderly individuals are affected by this process, their vulnerability, and coping capacity. By focusing on the flooding experiences of the elderly and their perspectives on this issue, the study can offer a perspective on solutions to existing problems.

Materials and methods

Research model

This study was planned qualitatively to reveal the experiences of people over the age of 65 before, during, and after the flood disaster. Qualitative research methods have strong theoretical foundations based on different disciplines. The common goal in these disciplines is to understand the behavior of individuals in their environment in a multidimensional way [58, 59]. Since the study aimed to obtain in-depth information, the phenomenology design was adopted. This pattern has a solid philosophical basis and often requires interviews [60]. The main goal of phenomenology is to understand the essence of the individual experience of an event [58]. Therefore, it was necessary to use the phenomenology design to reveal and describe in detail the subjective experiences of elderly individuals who survived the flood disaster in Türkiye.

Universe and the sample of the study

The population of the study consists of people over the age of 65 who experienced flood disasters in Türkiye. In determining the sample size of the study, data saturation was taken as basis. Purposive sampling techniques [61] were used for this study. Among the purposive sampling techniques, criterion sampling was preferred since the participants were required to have certain characteristics and maximum diversity sampling were preferred since it was difficult to reach the participants due to their age group [62]. When the sample size was evaluated, it was generally stated that interviews with 10–15 people were sufficient [63]. The most important issue to be considered when determining the sample size in qualitative methods is that the sample provides sufficient information (data saturation) about the targeted audience [64]. In this study, since the data were repeated after 14 people and no new findings were obtained, it was decided that data saturation was achieved, and the interviews were terminated. Each participant was interviewed once.

To ensure participant confidentiality, each participant is coded starting from P1 to P14. The socio-demographic characteristics of participants are given in Table 1.

The concepts of "swimming", "climbing", "phone", "computer", "cars", and "bicycle" in the competence and skills column show the competencies and skills of elderly individuals. The inclusion of concepts in the column shows that people have that skill and competence.

Inclusion and exclusion criteria

Since it is important to evaluate the experiences of elderly individuals who have experienced flood disasters in the study, people with the following criteria were included in the study:

- Experiencing a flood disaster,
- Being over the age of 65,
- Living in Türkiye,
- Agree to participate in the study voluntarily.

Table 1 Socio-Demographic characteristics of participants

	Gender	Meeting Duration	Age	Marital Status	Education	Profession	Number of Children	Regular Income	Disaster Education	Competencies and Skills
P1	Female	33	66	Married	Primary school	Housewife	2	No	No	Swimming, Phone
P2	Female	38	69	Married	Primary school	Housewife	3	No	No	Phone
P3	Female	40	78	Married	No	Housewife	3	No	No	Phone
P4	Male	50	73	Single	Primary school	Plumber (retired)	5	Yes	No	Swimming, Phone, Cars, Bicycle
P5	Female	62	65	Married	Primary school	Housewife	3	No	No	Phone
P6	Male	48	70	Single	Primary school	Farmer (retired)	1	Yes	No	Swimming, Phone, Cars, Climbing
P7	Female	54	69	Married	Primary school	Housewife	3	No	No	Phone
P8	Male	49	71	Single	High school	Farmer (retired)	0	Yes	No	Swimming, Phone, Cars, Bicycle, Climbing
P9	Male	65	70	Married	University	Teacher (retired)	1	Yes	No	Swimming, Phone, Computer, Cars, Bicycle, Climbing
P10	Male	37	75	Married	Primary school	Farmer (retired)	2	Yes	No	Swimming, Phone, Cars, Climbing
P11	Female	68	87	Single	Primary school	Housewife	3	No	No	Phone
P12	Male	52	72	Married	University	Imam (retired)	2	Yes	No	Swimming, Phone, Cars, Bicycle, Climbing
P13	Female	45	77	Single	Primary school	Housewife	4	Yes	No	Swimming, Phone, Climbing
P14	Male	34	65	Single	Primary school	Farmer (retired)	0	Yes	No	Swimming, Phone, Cars, Climbing

The exclusion criteria of the study were determined as follows:

- Not being suitable for the study in terms of age,
- Not experiencing the flood disaster,
- Being diagnosed with a mental illness,
- Leaving the study at any stage of the study.

Development of the data collection tool

Since it was aimed to obtain in-depth information in the study, a semi-structured interview form was used as a data collection tool. The researchers first conducted a large-scale literature review on topics such as the vulnerability of the elderly in disasters, the difficulties experienced by the elderly who experienced floods, and the disaster resilience and preparedness of the elderly. After a comprehensive review of the literature, an item pool consisting of 15 questions was prepared, which is thought to provide an in-depth examination of the subject. Then, questions were sent to two academicians who worked in the field of disaster management and three academicians who worked in groups with special needs in disasters. After the expert opinions, five questions were removed and two questions were added. After the necessary revisions were made, a semi-structured interview form consisting of 12 items was obtained.

Can you tell us about your preparations and experiences before experiencing a flood disaster? is a sample question.

A pilot interview was conducted with two participants who met the inclusion criteria to test the comprehensibility of the questions. At the end of the pilot interviews, no changes were made in the question and these participants were not included in the main study.

Data collection and analysis

A semi-structured interview form, which was prepared by the researchers by reviewing the relevant literature and taking expert opinions, was used to collect the data [41–43, 52,65–72]. The data of the study were collected between September and October 2024. The researchers went to the flood area and reached the participants. The research topic was explained to the participants in detail and interviews were started with the volunteers. An environment of trust was established by conducting social meetings. Interviews were conducted individually. The interviews were recorded with a voice recorder and the duration of the interviews varies between 33 and 68 min. A total of 675 min of recording was taken. After the interviews, the audio recordings were listened to repeatedly and transcribed in MS Word software. Then, the texts in the relevant documents were transferred to the MAXQDA 2022 licensed qualitative research software. MAXQDA software was preferred because it offers

rich analysis possibilities for qualitative research data and provides visual tools to comprehensively present the findings of the study. The data transferred to the software were coded, sub-themes and themes were created, themes and codes were arranged, and the findings were defined and interpreted. In the reporting phase of the study, the "Consolidated Criteria for Reporting Qualitative Research" (COREQ) criteria developed by Tong et al. [73] were taken into consideration. In the study, the interpretive phenomenology approach pioneered by Heidegger was used [74]. Interpretative phenomenology was adopted in the study as it focused on how elderly individuals perceive the flood disaster phenomenon, individual differences, and experiences [75]. The data were analyzed in the context of social, physical, and economic vulnerability and disaster gerontology [76].

The study data were analyzed within the framework of the following questions:

- What are the preparations of elderly individuals against flood disasters?
- What are the factors that make elderly individuals vulnerable to flood disasters?
- What are the behaviors, reactions, evacuation skills, and coping capacities of elderly individuals during a flood disaster?
- What are the post-flood needs and lessons learned of elderly individuals?

Validity and reliability

In qualitative studies, some strategies should be adopted to increase the validity, confirmability, transferability, credibility and dependability of the study [77].

Validity: In this study, to ensure validity, detailed information about the participants was presented, inclusion and exclusion criteria were determined, the statements presented by the participants during the interviews were summarized, and participant feedback was received regarding their accuracy. In addition, the fact that direct participant citations were included in the presentation of the findings supports that the findings match the collected data and do not reflect the subjective feelings of the researchers [78, 79].

Confirmability: The fact that direct participant citations were included in the presentation of the findings supports that the findings match the collected data and do not reflect the subjective feelings of the researchers.

Transferability: The region where the research was conducted, the participant profile and the social context are described in detail, enabling the reader to evaluate the applicability of the results to similar situations.

Credibility: Participant confirmations were obtained to ensure the credibility of the study. The themes were finalized by ensuring agreement between the coders in the creation of the themes. The fact that the researchers have expertise in disaster management has supported the credibility. The fact that Ezgi Atalay, one of the researchers, conducted a doctoral thesis on the resilience of the elderly in disasters and the other researchers conducted studies on vulnerable groups in disasters can also be considered to support credibility.

Dependability: Another important issue in qualitative studies is dependability [80]. In this regard, to ensure dependability, the researchers presented the stages of collection, analysis, and interpretation of data. Expert opinion was taken at every stage, from the creation of questions to the creation of themes. The interviews were recorded.

Ethical consideration

Before starting the study, approval was obtained from the Bolu Abant İzzet Baysal University Human Research Ethics Committee in Social Sciences (Protocol No. 2024/282 Date: 04.09.2024). The Declaration of Helsinki was adhered to. The "Higher Education Institutions Scientific Research and Publication Ethics Directive" was followed throughout the research. Before the interviews, the participants were informed about the study, their informed consent and signatures was obtained. Participants were informed that they could leave at any stage of the study. It was reported that participation in the study was completely voluntary. Participants were informed that their identity information and interview records would not be shared with third parties. Care was taken to ensure that there was no conflict of interest between the researchers and the participants.

Results

As a result of analyzing the findings, three themes emerged: Elderly people's risk knowledge and their views on the preparation process (Theme 1), the vulnerabilities and coping capacities of the elderly individuals during the disaster (Theme 2), and post-flood needs, social network relationships, and lessons learned (Theme 3) (Table 2).

Theme 1: Elderly people's risk knowledge and their views on the preparation process

The views of elderly individuals on the pre-disaster process were evaluated as sub-themes of local risk information, disaster preparedness, and communication of early warnings (risk communication). Before the flood disaster, elderly individuals stated that they had not prepared for the flood disaster and did not have enough information for preparation. In terms of taking precautions in case of a flood disaster, some elderly individuals stated that they should not stand near streams, they should go to high places (P1) and they should check their medicines and basic needs (P2).

Table 2 Themes and sub-themes created for the experiences of elderly individuals regarding the flood disaster

Theme	Sub-Theme
Theme 1: Elderly people's risk knowledge and their views on the preparation process	• Local risk information • Disaster preparedness • Communicating early warnings (risk communication)
Theme 2: The vulnerabilities and coping capacities of the elderly individuals during the disaster	• Vulnerabilities • Evacuate • Social capital • Physical and material losses • Trauma reactions
Theme 3: Post-flood needs, social networking relationship, and lessons learned	• Needs • Social network relationship • Displacement • Establishment of the village crisis committee • Lessons learned in the aftermath of the flood

The knowledge of elderly individuals living in a rural area about the local risk information (risk knowledge) about the region they live in was assessed. In this regard, it was determined that there are earthquake, flood, and landslide hazards in the region, there is Melen Stream nearby, there is a dam and stream beds in the region, the stream beds are not rehabilitated, a flood disaster was experienced 60 years ago (disaster history), there are bridges built by the villagers in the region, and there are settlements in the stream basin. It was observed that elderly individuals have local disaster hazard and risk knowledge. On the other hand, the elderly did not make individual disaster preparations. The reasons for the lack of individual preparation are generally as follows: Not having enough information for preparation, people thinking that they will not experience such a destructive flood disaster, and this is the first time that a flood disaster with a highly destructive effect has been encountered. The opinions of elderly individuals regarding the local hazard information about the region they live in are as follows:

P1: "*Many years ago (60 years ago) there was a flood here. But I didn't know because I had never experienced it.*"

P4: "*Our village is quite large. But there is a settlement within this stream basin.*"

P3: "*Human beings also have faults. Once there was a stream here.*"

Evaluations were made on the situation of communicating early warning information to elderly individuals before the flood disaster. Elderly individuals stated that they took early warning information into account, but early warning information was not communicated. Opinions on the subject are as follows:

P5: "*There was no warning whatsoever. We've never heard of it.*"

P6: "*Whether it's on the phone or an announcement from somewhere, from the news, I'll definitely take it into account. If the news comes, I'll run away.*"

Theme 2: The vulnerabilities and coping capacities of the elderly individuals during the disaster

When the experiences of elderly individuals during the disaster were evaluated, sub-themes were created for vulnerabilities, evacuation, physical and material loss situations, social capital, and trauma reactions.

Sub-theme: Vulnerabilities

It was determined that elderly individuals were trapped in flood water, engaged in risky behaviors, witnessed people drowning in the flood, their animals were exposed to flood water, and their houses were filled with flood water. Elderly individuals expressed the vulnerabilities they experienced in their homes as follows:

P1: *"Since my house is one-story, the water came up to human height very quickly."*

P6: "*By the time we left the house, the water was up to our waists. We were leaving, and the flood was coming after us.*"

A participant, P7, who engages in risky behavioral actions stated the following: *"You're stepping up, you're sinking. Water and mud pass the heels. That soil absorbs me like a sponge"* The same participant described witnessing the people who lost their lives in the following words: *"Those shops you see, the grocery stores (pointing to the researcher), where that mosque is, came down from here. People were shouting as they were dying. Some of them held on to a tree, seven people went (died)."*

Another participant described his risky behaviors as follows: P8, "*The head of the bridge was missing, it was blown away. We crossed the bridge on foot.*"

The participants described the situation they experienced when their houses were flooded as follows:

P10: "*There was flooding all around me. When I woke up, there were great noises in the house. Trees and stones were beating against the house. When I went downstairs, there was no downstairs, there was water everywhere.*"

P9: "*The water started coming. We tried to push the water away with the brush, but when it came to our knees, we immediately went in and tried to close the door, but its power was beyond us.*"

The area where the study is carried out is rural. Some participants are engaged in livestock activities. In this regard, elderly individuals lost their animals (sheep, cattle, and bees) due to the flood disaster. Animals drowned in flood water. One participant stated that he moved his animals to a safe area before the flood water came to the barn.

P10: *"I had 300–400 sheep. I woke them up, they were sleeping. I took them to a safer place."*

In the study, a relational analysis was made between the local risk knowledge of elderly individuals and the vulnerabilities they experienced during disasters. The fact that elderly individuals are aware of the hazards and risks in the region where they live, but the lack of disaster preparations for this has caused vulnerability. It was determined that the lack of reclamation of the stream beds has caused the houses to fill with flood waters, to be trapped in the flood water/mud, and to cause damage to the animals. There was a strong correlation between the risk knowledge of the participants and the lack of reclamation of the stream beds, the house is filled with flood waters, and they are trapped in the flood (Fig. 1). In the figure, the line thicknesses show the relationship frequencies. As the lines thicken, the relationship between them increases.

Sub-theme: Evacuate

When the evacuation behaviors of elderly individuals during the flood disaster were evaluated, it was determined that they climbed to high places, went to the upper floors where they were, took shelter where they were (shelter in place), waited to be evacuated by helicopter, evacuated with auxiliary equipment, and auxiliary teams and equipment (buckets, tractors, helicopters, and cars) were used in the evacuation. One participant (P8) stated he climbed a tree and waited for three (3) hours to be rescued. P6 stated that he had to carry his mother during the evacuation. P1 stated that she asked for help from her neighbors and relatives for the evacuation, but did not receive a response. The opinions of the participants about going to high places in evacuation are as follows:

P1: "*We climbed the stairs to my neighbor's house. We waded in that water like that. We swam out."*

P4: *"We weren't alone. There were 11 of us. We had guests and children. We were in our own troubles. We ran around in such a hurry. We ran away from there."*

The participant described the process of climbing the tree in the evacuation as follows:

P10: *"I want to go down from the second floor but I can't. Flooding everywhere. I climbed a tree away from the house. I stayed in the tree for three (3) hours. Meanwhile, helicopters are flying overhead, but they don't see me. I couldn't hold the tree anymore. I take one profile iron, a five-meter profile iron. I've jumped across with the pole vault. So it's inexplicable now."*

The participant, who was evacuated to the upper floor of the house, described the process she went through as follows:

P11: "*We went upstairs. The door was locked. We forgot to take the key. It didn't occur to us anyway, we forgot about it with that fear. It's pitch black, you can't get in."*

A participant who received help during the evacuation describes the process as follows:

P12: "*I had water up to my knee. I barely got to the side of the car. I got on the tractor as the owner of that tractor held my arm."*

The participant, who was evacuated by helicopter, describes the process she went through as follows:

P3 "*The helicopter has arrived. I waved something from the balcony. But he didn't see me. Came again. This time I went up to the top of the house, towards the roof. I swung from there, they came, I survived."*

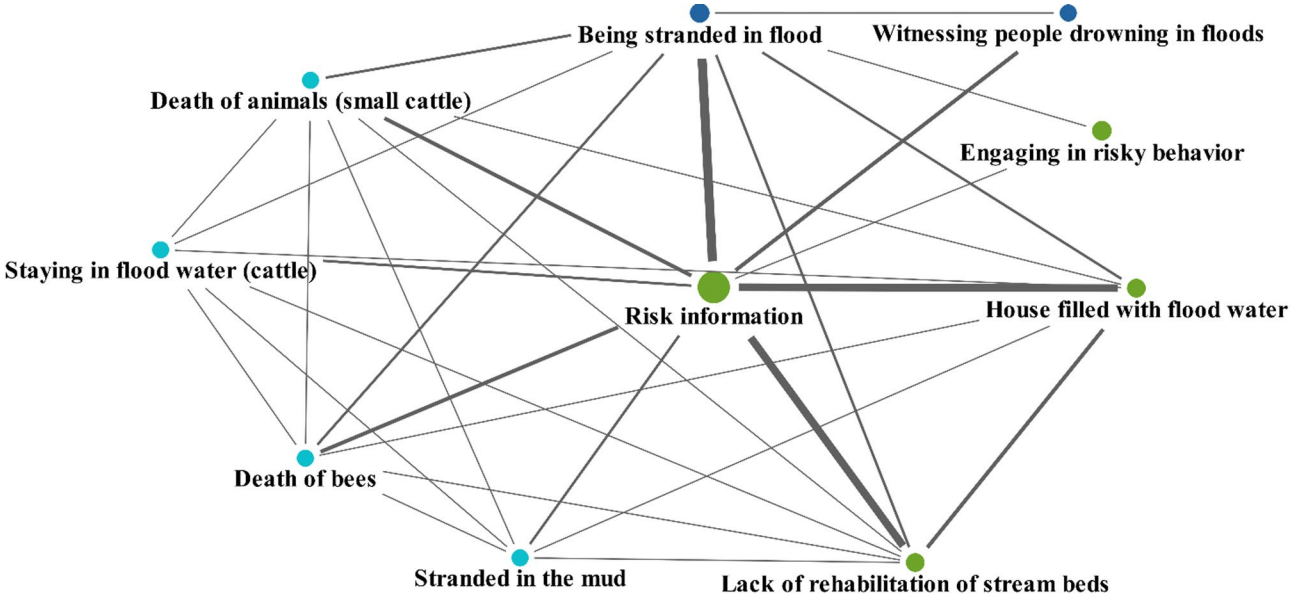

Fig. 1 Relational analysis between the local risk knowledge of elderly individuals and the vulnerabilities they experienced during disasters

Sub-theme: Social capital

It was determined that flood information is transmitted among citizens, there is support from neighbors and relatives, and people are trying to reach their children. One participant (P3) stated that she called 112 and asked for urgent help.

P10 stated that he was asked for help but was unable to help:

P10: *"After I saved myself, they shouted at me from the top of the roof in the morning. Save us, uncle. How am I going to save them? One of them was speechless. He couldn't speak for a month or so."*

Participants shared their experiences with the transmission of flood information among citizens as follows:

P2: "*We warned people. We told them to move their vehicles. There were people in the café, but no one expected anything like this."*

P4: *"When the flood started coming this way, my son and daughter came running immediately. They said we need to get out now."*

Regarding the support of neighbors and relatives, the participant expressed the following:

P1: "*One of the relatives, who lived upstairs, came and took us."*

Sub-theme: Physical and material losses

Elderly individuals stated that they experienced physical and financial losses due to the flood disaster. It was determined that there were physical and material losses such as the closure of access roads, power cuts, destruction of houses covered with mud, damage to clean water sources, water cuts, flooding of cars and tractors, damage to telephone networks, destruction of bridges, landslides and cavities in the gardens, damage to hazelnut orchards, and damage to collected hazelnuts (loss of agricultural products).

Sub-theme: Trauma reactions

When elderly individuals were asked about their emotions and feelings during and after the disaster, it was determined that they experienced the most fear. Physical, emotional, and cognitive reactions such as sadness, crying, inability to forget, feeling insecure in the living space, panic, anxiety, thinking that they are going to die, saying the word of martyrdom (Islamic requirement), making peace with relatives, experiencing eating disorders, not being able to sleep, feeling palpitations when it rains, and thinking that their labor has been lost were observed. One participant (P12) stated that he had chills while describing the moments he experienced during the interview and that the effect still continues.

Theme 3: Post-flood needs, social networking relationship, and lessons learned

When the experiences of elderly individuals in the post-disaster process were evaluated, sub-themes such as social network supports, displacement, establishment of the village crisis committee, and lessons learned were created.

Sub-theme: Needs

It was determined that elderly individuals have needs such as clean water, medicine, a house, toilet, nutrition, clothing, and health care in the post-disaster period. Elderly individuals describe their needs as follows:

P2: "*There may be water in the central neighborhoods, but since the main network, which affects 80% of the main population, collapsed, there was a shortage of water and hygiene problems."*

P10: "*We couldn't get food, we were left without food. About three days no one could reach us."*

P10: *"I tried to get my medicines. I had heart-related medications. Would you believe it? The pharmacy didn't pay for it, they didn't give me the medicines. I asked them to give me the medicines and I would pay for them later, but they wouldn't. They asked for a report. And where can I find the report? The house was flooded. I couldn't take medicine for a week."*

Sub-theme: Social network relationship

Elderly individuals mentioned the assistance of central and local administration, non-governmental organizations, and local people (spontaneous volunteers) in the post-disaster process. P2 mentioned that spraying works were carried out against the risk of epidemic diseases in the region. It was determined that their neighbors and relatives supported the elderly in meeting their needs after the disaster. The needs of the elderly were met through neighborly and family relations in the region. Elderly individuals described the support and assistance they received as follows:

P2: "*Everyone helped, including AFAD, the Istanbul Fire Brigade, the Red Crescent, and volunteers."*

P11: "*We took refuge in one (referring to her neighbor) for six months, we took refuge in the other (referring to her neighbor) for six months, but it doesn't work like that, it doesn't work. One also needs to think about the other person. I wanted to come back home."*

P7: "*My kids came, they went down the hill. We hugged each other with the children. It was the morning that day."*

Sub-Theme: Social network-need relationship

A correlation analysis was conducted on the needs of elderly individuals and social network support mechanisms in the post-disaster period. As a result of the relational analysis, it was determined that clean water,

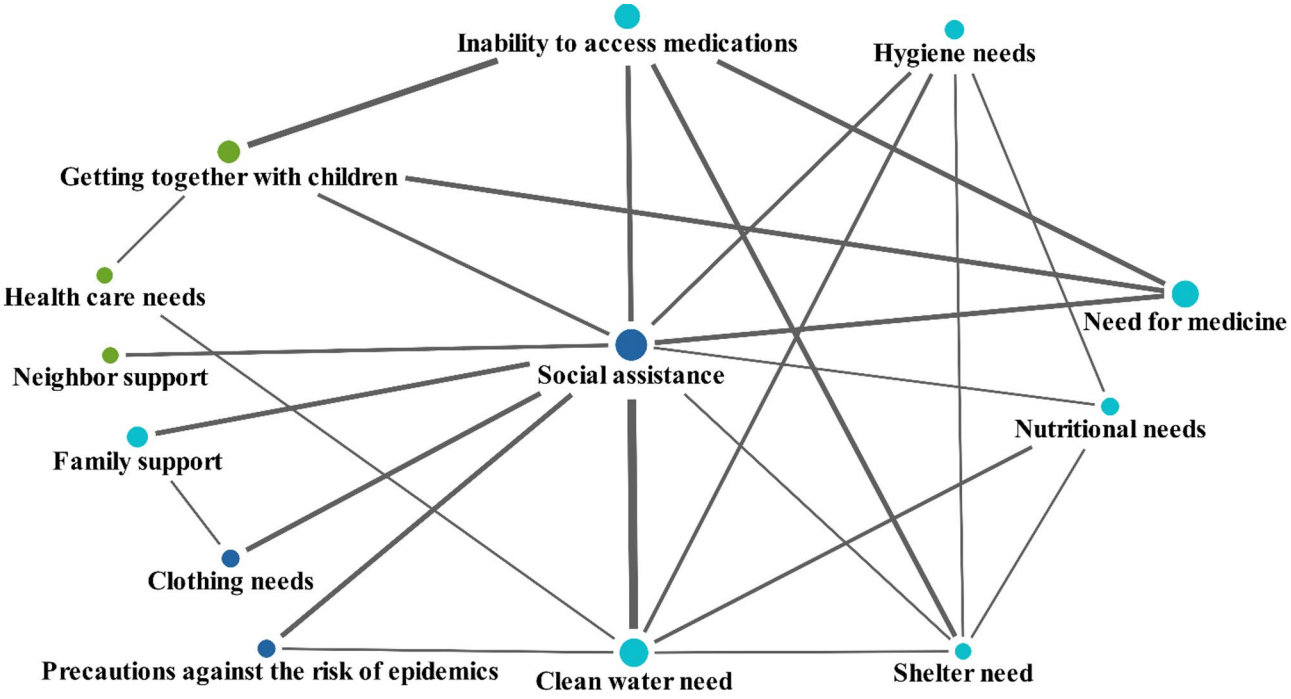

Fig. 2 Correlation analysis on the needs of elderly individuals and social network support mechanisms in the post-disaster period

medicine, nutrition, shelter, clothing, and hygiene needs were tried to be provided within the framework of social assistance. There was a correlation between the need for medication and the inability to access drugs. In the social network relationship, the prominent categories were family support, neighbor support, meeting with children, and coming together behaviors. It was determined that the needs were tried to be met with these support mechanisms. In particular, the need for health care was provided with support after meeting with their children. In the figure, the line thicknesses show the relationship frequencies. As the lines thicken, the relationship between them increases (Fig. 2).

Sub-theme: Displacement

Elderly individuals have been displaced after the flood disaster they have experienced. It was observed that relocation was achieved with family support.

P1: "*By moving around, I felt like I was safer.*"

Sub-theme: Establishment of the village crisis committee

Elderly individuals stated that in the post-disaster period, they formed a crisis committee among themselves to meet the needs of the affected people in the region. This committee identified the needs of around 70 neighborhoods and worked to meet these needs.

Sub-theme: Lessons learned in the aftermath of the flood

Elderly individuals stated that early warnings were immediately delivered to them in the post-flood period, that they considered these warnings and acted in the right way, and that they should be cautious and prepared for the flood disaster. Emphasis was placed on supporting elderly individuals in evacuation. It was stated that after the flood disaster, stream improvement works in the region were carried out more frequently and institutional measures were taken. Participant opinions about the lessons learned are as follows:

P2: "*AFAD immediately sends a warning about a possible flood. Mukhtars are informed. Announcements are being made. They want to move away from the riverbeds.*"

P3: "We get an instant alert message on our phones. The gendarmerie is personally roaming."

P11: "*Now meteorology is giving immediate notice. It didn't exist back then. Now we take it into account. At that time (referring to the flood she experienced) we would have considered it. If there's a place I can run to just for my life, I'll run there.*"

Discussion

In this study, in which the experiences of elderly individuals in the flood disaster in Türkiye were examined, it was determined that elderly individuals were aware of local disaster hazards. However, despite this, it was observed that the elderly do not make individual disaster preparations. The reasons for the lack of individual preparation are generally as follows: Not having enough information for preparation, people thinking that they will not experience such a destructive flood disaster, and this is the first time that a flood disaster with a highly destructive

effect has been encountered. It is considered important to transmit early warnings in disasters, to receive/notice these warnings by the individuals who make up the society, and for the society to act correctly in disasters. However, in this sample, it was determined that elderly individuals do not have sufficient access to early warning messages before the flood disaster occurs. The development of early warning systems and the timely and effective transmission of warnings are important for elderly individuals. In line with the findings of our study, there is evidence in the literature that the elderly are largely inadequate in terms of preparation [38, 55, 81, 82]. Heagele [83] stated that the elderly are unprepared for emergencies and disasters. The reason they are unprepared is mostly due to a lack of training on how to prepare. It was stated that those who are prepared are due to their previous professional or disaster-related experiences. In a study investigating the flood preparedness of elderly individuals, it was revealed that elderly individuals have limited experience in using information technology for flood preparedness. An aging population and a lack of education and knowledge on disaster preparedness are key barriers to improving community flood resilience [54]. Chandra et al. [84] stated that adults over the age of 65 create and mobilize social capital with their experiences in disaster situations, thus contributing to social solidarity and disaster management. Al-Rousan et al. [85] determined that two-thirds of adults aged 50 and over reported that they did not have an emergency plan, did not receive preparedness training, and were not aware of available resources. Shih et al. [86] reported that very few people over 65 are trained, sometimes because older people do not prioritize or take seriously the potential benefits of preparedness. Phraknoi et al. [87] emphasized the importance of addressing the needs of the elderly in disasters with a holistic approach. It was stated that the studies should go beyond health-oriented approaches and determine a specific policy that includes socioeconomic, evacuation, information and communication, and cultural needs. To reduce the vulnerability of elderly individuals to flood disasters, it is recommended that increasing access to early warning systems, disseminating disaster preparedness training, creating safe evacuation plans, and strengthening social support networks should be among the priority policies.

In this study, it was determined that elderly individuals were trapped in the water during the flood disaster, engaged in risky behaviors, saw those drowning in the flood, and lost their dependent animals. In addition, the homes of elderly individuals were damaged by flooding. It was determined that elderly individuals climbed to high places to evacuate during floods, went to the upper floors where they were, took shelter where they were (sheltering in place), waited to be evacuated by helicopter, evacuated with auxiliary equipment, and used auxiliary teams and equipment (bucket, tractor, helicopter, and car) in evacuation. In disasters, evacuating the elderly without taking into account their vulnerability may increase the risk of death [88]. The amount of time that elderly individuals spend in activities such as waiting for others to evacuate, obtaining information, and collecting their belongings significantly affects the evacuation process [89]. The presence of flooding, rather than the height of the flood water, adversely affects the evacuation of the elderly. Therefore, it is necessary to start evacuation before flood water arrives [53]. Effective evacuation plans should be made for the elderly, as the evacuation of the elderly in flood events brings with it many potential challenges [52]. Nakanishi et al. [90] found that the difficulties faced by the elderly in the event of a natural hazards are common. In their study conducted with survivors of the 2011 Northeast Japan earthquake and tsunami, Muramatsu and Akiyama [91] found that elderly individuals using walkers or wheelchairs needed more time in the evacuation and preparation processes. In flood disasters, it is seen that elderly individuals face serious risks both physically and emotionally. This situation reveals the need to plan appropriate equipment and support services during evacuation processes, as well as to develop disaster preparedness programs specific to the needs of elderly individuals.

In this study it was determined that flood information was transmitted among citizens, they had the support of neighbors and relatives, and they tried to reach their children. In the post-disaster period, it was determined that elderly individuals needed clean water, medicine, shelter (house and toilet), nutrition, clothing, and health care. It was determined that their neighbors and relatives provided support in meeting these needs. The needs of the elderly were met through neighborly and family relations in the region. Having a social bond such as family, friends, and relatives, and receiving support after disasters provides support to elderly people in coping with disasters [92]. Heid et al. [93] determined that elderly individuals overcame the difficulties they experienced in disasters with the support of family, friends, neighbors, and volunteers from the community. The study emphasizes the importance of social support in increasing the resilience of the elderly in disasters [93]. Akaish et al. [94] stated that clean drinking water supply is among the most affected vital resources in disasters. Phraknoi et al. [87] determined that there are five basic needs of elderly individuals in disasters: health, socioeconomic well-being, evacuation and settlement, information and communication, and cultural needs. Yodsuban and Nuntaboot [95] emphasized that the needs of elderly individuals should be met at all stages of flood disaster. It was reported that this process requires multi-stakeholder collaboration

between families, communities, local authorities, the private sector, and NGOs. It was observed that neighborhood and kinship relations play a critical role in meeting the basic needs of elderly individuals after a disaster. This highlights the importance of strengthening community solidarity and integrating social ties into disaster management strategies.

Limitations

This study has some limitations and strengths. The findings of this study cannot be generalized to other types of disasters and are limited only to the statements of volunteer participants. While the focus in Türkiye has been on earthquake disasters, research on the flood disaster experiences of the elderly, a particularly vulnerable group in disasters, is considered a specific topic and a strength.

Conclusion and recommendation

The fact that elderly individuals are aware of local disaster hazards and do not prepare for disasters individually increases their vulnerability to disasters. It was considered that the inadequacy in the preparedness of elderly individuals and access to early warning messages before disasters may cause them to engage in risky behaviors and become trapped in water. Community support such as neighbors and relatives has an important place in meeting the needs of elderly individuals in the post-disaster process. On the other hand, in the post-disaster period, it was observed that elderly individuals formed a "village crisis committee" with volunteers among themselves to meet the needs of the affected people in the region. In this regard, benefiting from the knowledge and experience of elderly individuals and ensuring the participation of the elderly in disaster management is important in building social resilience. Barriers to individual preparedness and early warning access can be specifically investigated and form ideas for future studies.

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