



Health Needs of Older Adults After Natural Disasters: A Systematic Literature Review

Shokoufeh Ahmadi,¹ Hamidreza Khankeh,^{2,3,*} Robab Sahaf,⁴ Asghar Dalvandi,⁵ Seyed Ali Hosseini,⁶ and Shiva Jalilvand⁷

¹Health in Emergency and Disaster Research Center, Student Research Committee, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran

²Health in Emergency and Disaster Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran

³Department of Clinical Science and Education, Karolinska Institute, Sweden; Clinical Psychology and Psychotherapy, Leipzig, Germany

⁴Department of Aging, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran

⁵Department of Nursing, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran

⁶Department of Occupational Therapy, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran

⁷Department of Psychology, Islamic Azad University, Sari, IR Iran

*Corresponding author: Health in Emergency and Disaster Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, IR Iran. Tel: +98-9123767147, E-mail: hamid.khankeh@ki.se

Received 2017 May 01; Revised 2017 September 11; Accepted 2017 October 21.

Abstract

Background: Older adults are disproportionately affected by natural disasters. The literature on the health needs of older adults after natural disasters is limited.

Objectives: The aim of this study was to examine the existing evidence on the health needs of older adults after disasters. This systematic review of the literature was conducted to provide an overview of what is known about the needs of older adults after natural disasters.

Methods: An electronic search of the following databases was conducted: PubMed, Cochrane, ProQuest, Web of Science, Google Scholar, and HelpAge International. The final review included 27 articles that were analyzed using qualitative content analysis to identify the health needs of older adults after natural disasters.

Results: Limited and sparse literature exists pertaining to the health needs of older adults after natural disasters. In this study, six themes or features of health needs emerged: medical needs, psychosocial needs, assistance in activities of daily living, resources, informational needs, and protective needs. Furthermore, four categories including personal, organizational, socio-cultural, and disaster-related factors could affect the health needs of older adults after natural disasters.

Conclusions: Planning for older adults with diverse and special needs in disasters is very important. Health care providers should consider the older adult's health needs and capacities in the disaster recovery.

Keywords: Aging, Need, Natural Disaster, Older Adults

1. Context

The population of older adults across the world is growing and this trend is remarkable in the 21st century. It is estimated that in the next 40 years, the elderly population will have doubled; and the elderly will account for 22 percent of the world's population by 2050 (1). At the same time, the average annual incidence of natural disasters has increased from about 125 in the early 1980s to 500 in early 2006 (2). About 150 major natural disasters affected millions of people worldwide in 2015 (3).

With regard to the growth of the elderly population, disasters can lead to major challenges (4). Some factors such as reduced adaptability to heat, cold, sunlight, and humidity (5), social and economic limitations (6), reduced

motor abilities, age-related declines in visual and auditory perception (7), and different reactions to dangers may increase the vulnerability of older adults to disasters. Moreover, some of the older adults need more time to process information and have delayed physical reactions (8). Given some degree of decline in cognitive capacity, high prevalence of chronic diseases, interruption of service delivery (9), physiological derangements like reduced cardiac output and increased blood pressure, impaired gas exchange in lungs, and decreased vital capacity, the risks of complications and serious problems in older adults are likely to increase (10). Some previous studies indicate that elderly people are the most vulnerable group in times of earthquakes or other meteorological disasters such as hur-

ricanes and heat waves.

Meteorological disasters are caused by short-lived, micro to mesoscale extreme weather and earth's atmosphere (11, 12). During the heat wave in Europe in 2003, fatalities were predominantly among older people (13). Older adults were also the least likely group to survive the Indian tsunami in 2004 (14). Moreover, 56 percent of all patients admitted to medical units after Hurricane Katrina were people older than 65 years (15).

Given the high number of deaths and injuries among the elderly, this population deserves special attention (16, 17). Likewise, according to human right laws, every person has the equal rights to protection (18). The first step towards protecting older adults is the awareness of their needs, which may differ from the needs of other groups in disaster situations (19). It seems that a major reason for the failure of disaster plans is the mismatch between the provided services and the needs of the affected population (20, 21). The present study was therefore designed to provide a synthesis of research on the health needs of older adults after natural disasters.

2. Methods

To identify the needs of older adults after natural disasters, we conducted a systematic review by conforming to the preferred reporting items for systematic review and meta-analyses (PRISMA) guideline.

2.1. Search Strategy

An electronic search of the following databases was conducted from October 2015 to May 2016: PubMed, Cochrane, ProQuest, Web of Science, Google Scholar, and HelpAge International. Of these, HelpAge International was used as a supplemental database. It has been identified as one of the most comprehensive resources for studies dealing with older adults in disasters. The search terms and keywords were selected after consultation with geriatric experts and disaster risk management experts. The references of relevant studies were assessed to identify any study that may have been overlooked due to the use of unusual keywords. We used the search strategy of PubMed as a model for searching other databases (Box 1).

The search strategies for PubMed were limited to articles published in English and involving human-related studies. In the ProQuest search, a combination of terms in the abstract was searched limited to the English language. For Cochrane, using the advanced search, data were limited to title, abstract, and keywords. While gathering information within Web of Science, the data were limited to

the topic (TS) of the articles. Since the first article was published in 1992 (22), all databases had a publication year limitation from 1992.

2.2. Inclusion Criteria

All primary and secondary articles, summaries, and case reports linked with the health needs of older adults after natural disasters were included in this review. In addition, the included articles were selectively based on the following inclusion criteria, which have been designed by incorporating expert opinions and related literature.

2.2.1. Articles Pertaining to Studies Emphasizing a Natural Disaster Situation

A disaster situation is defined as a situation or event that overwhelms local capacity, necessitating a request to national or international assistance (23). The natural disasters included in the literature search as described in the international classification of natural disasters consisted of geophysical (e.g. earthquakes, tsunamis), biological (e.g. epidemics, insect infestations), and hydro-meteorological (e.g. landslides, extreme temperature, floods, and storms) disasters (24, 25).

2.2.2. Outcome Criterion

Studies involving the assessment of health needs of older adults following natural disasters were included. The concept of "need" covers all needs felt or expressed by older adults and professionals. It takes into account people's capacity to benefit from healthcare programs (26).

2.2.3. Population Criterion

Older adults aged 60 or over, who had been directly exposed to natural disasters, only were considered. The age of 60 years is the threshold age for defining the elderly, as used by the world health organization (WHO) (2).

2.3. Exclusion Criteria

Non-English articles.

3. Study Selection

The preliminary literature search produced nearly 6 144 references. Initially, any duplication was discarded by the first author. Then, by assessing the titles of the articles, the articles that contained at least one of the inclusion criteria were chosen. Articles with at least one of the exclusion criteria were deleted at this stage. In the next stage, 74 articles were retained after reviewing their abstracts. The full text of these articles was assessed by the first author to

Box 1. PubMed Search Strategy**Keywords**

Keywords relating to Disaster

(Disaster OR "Natural Disasters" OR Disaster AND Natural OR Disasters AND Natural OR "Natural Disaster" OR crisis* OR mass emergency OR life event* OR traumatic event* OR environmental exposure OR calamity* OR mass accident)

AND Keywords relating to Need

(Needs OR demand OR care need OR medical needs OR medical service OR medicine needs OR aftercare needs OR psychosocial needs OR practical needs OR logistic needs OR communication needs OR accommodation needs OR food needs OR financial needs OR information needs)

AND Keywords relating to older adult

(Old OR Senior OR elder*OR geriatric OR aged OR "older adult")

Limits: [Date of Publication: 1992-2016; English Language; Human]

determine their eligibility. This was done under the supervision of the second author (HR.Kh) of this research. Any discrepancy associated with the selection of studies made by the first two authors was resolved by consulting other authors. Finally, 27 studies were included in this review. The study selection flow diagram is shown in [Figure 1](#).

4. Data Evaluation

The articles used in this review were classified based on the hierarchy of evidence recommended by Fineout-Overholt et al. (27). In this type of classification, the types of resources are classified between I and VII. The classifications are as follows: (I) systematic review or meta-analysis, which is the most powerful type of resource; (II) randomized control trial; (III) non-randomized control trial; (IV) cohort studies or case studies; (V) systematic review of qualitative or descriptive studies; (VI) qualitative or descriptive studies; and (VII) opinion and consensus.

5. Results

In this review, the searched articles belonged to types IV to VII. Out of the 27 selected articles, one was a non-randomized control trial-based study (3.7%), one was a cohort study (3.7%), four were reviews of descriptive and qualitative studies (14.8%), nine contained the opinions or consensus of authors and/or report of expert committees (33.3%), and 12 were qualitative or descriptive studies (44.4%).

A review of the existing studies revealed that the health needs of older adults are dealt with in nine studies conducted after natural disasters in the United States (33.3%).

5.1. Outcome Categories

In specifying the importance of relevant criteria and categorizing them, the results of these studies were primarily coded based on a qualitative content analysis

method. This method can identify key patterns, themes, and categories. Six themes or features of health needs emerged: medical needs, psychosocial needs, assistance in activities of daily living (ADL), resources, informational needs, and protective needs ([Table 1](#)).

5.2. Medical Needs

The dominant theme in the existing literature was the medical needs of older adults. The theme relates to health needs of the body. This category contains two subthemes: pre-existing medical needs and medical needs arising from disasters.

5.2.1. Pre-Existing Medical Needs

Some older adults had pre-existing medical problems that needed routine services; for example, diabetic patients may need a special diet or routine medication. On the other hand, following disasters, some pre-existing medical problems may be aggravated ([25, 31, 38, 42, 48](#)).

Pre-existing medical needs denote the management, support, and treatment of chronic diseases (such as cardiovascular diseases, diabetes, and high blood pressure), non-contagious diseases, and other pre-disaster health problems or their symptoms and signs. The findings of some studies showed that chronic diseases may interfere with older people's ability to evacuate; for example, somebody with the chronic obstructive pulmonary disease (COPD) who is trying to go down the stairs may face difficulty in evacuating ([32, 33, 38, 42](#)). Moreover, chronic diseases can interfere with access to services after disasters; for example, a person with arthritis may have problems standing in line for access to services ([32](#)). Furthermore, some chronic diseases may have a role in activities of daily living limitations ([38](#)).

5.2.2. Medical Needs Arising from Disasters

This type of needs encompasses the management, support, and treatment of medical needs that did not exist

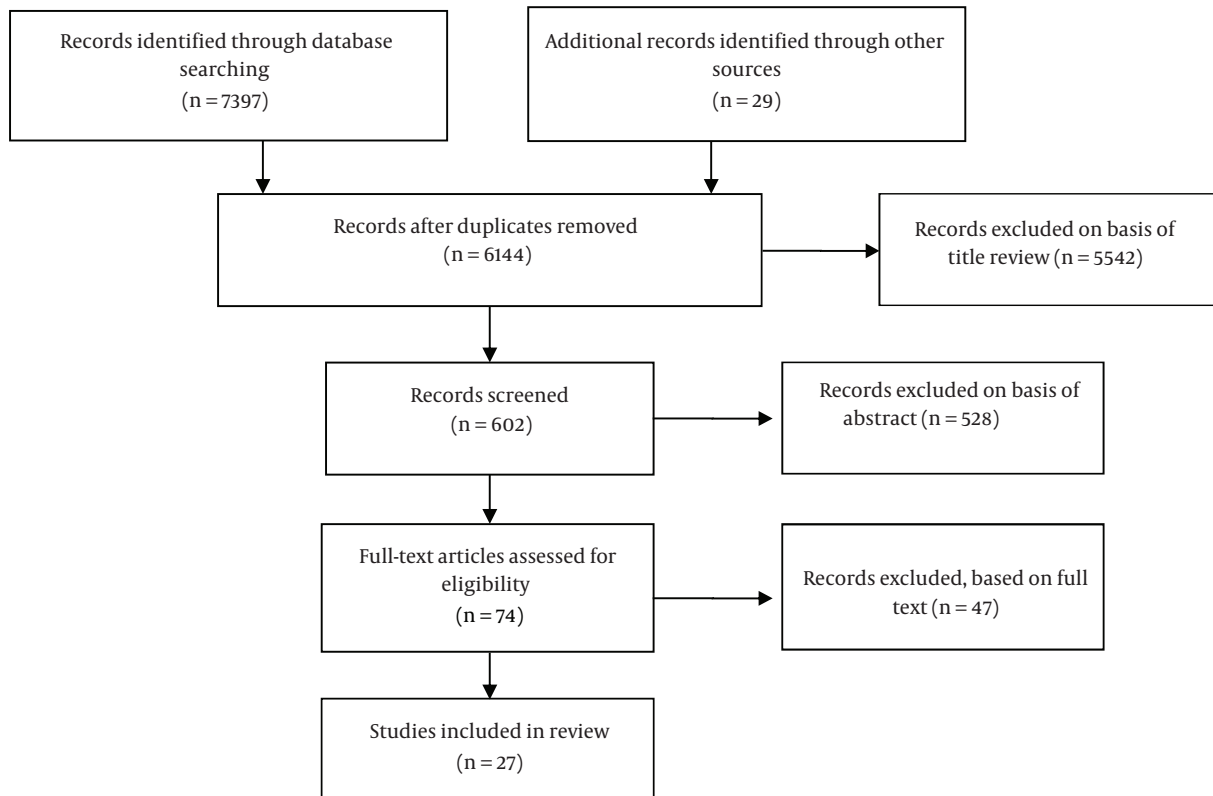


Figure 1. PRISMA 2009 flow diagram

Table 1. Needs of Older Adults After Natural Disasters

Theme (Features of Health Needs)	Definition
Medical needs	The theme relates to health needs of the body; this category contains two subthemes: pre-existing medical needs and medical needs arising from disasters.
Psychosocial needs	Psychosocial needs consist of mental and emotional health needs and social needs.
Assistance in activities of daily living (ADL)	The needs for assistance in activities of daily living (ADL), which are defined as activities that are necessary to carry out an independent life
Resources	This theme represents a human resource and the materials required by persons, communities, and organizations after natural disasters. There are four subthemes related to this theme: basic needs, financial resources, assistive devices, and human resource.
Informational needs	This theme addresses the informational needs and consists of two subthemes: access to information and tracking system.
Protective needs	Protective needs encompass two subthemes and refer to standards of health care and older adult's security.

prior to the disaster. Rather, they are caused by the disaster. These problems include different types of injuries (sprain or strains, fractures, lacerations), falling, trauma, dehydration, dangerous changes in blood pressure, physical impairment, lack of mobility, severe physical fatigue, headache, and stomachache (2, 15, 22, 32, 33, 40, 41, 43, 46, 49). Some studies reported the possibility of falling or injuries after evacuation (2, 22, 32, 33, 46, 49). Three studies

included in this review reported that many of the injured elderly had disabilities (2, 22, 42).

5.3. Psychosocial Needs

Based on the explored concepts and our analysis of the literature, mental and emotional health needs and social needs define psychosocial needs.

5.3.1. Mental and Emotional Needs

It is accepted that the amount of change in mental and emotional status is related to natural disasters; the purpose of addressing mental and emotional needs is that this response is not in a manner that is out of proportion, extreme, or uncontrollable.

The review of the literature showed that post-disaster conditions could contribute to some issues such as leaving home, agitation, sleep difficulties, increased use of drugs or alcohol, lack of attention, guilt, doubt, and loneliness, which might call for psychological intervention (42). Some mental and emotional needs include the need for caring of mental disease, distress, confusion, being unable to speak, cognitive impairment, and need for supporting network and maintaining older adults dignity (25, 29, 41, 42, 50).

5.3.2. Social Needs

The second important part of psychosocial health needs is social needs, which include a feeling of belonging and a feeling of mutual connectivity, the need to love and be loved, sympathy and support from others, help from others when needed, and healthy relationships with others (30, 32, 35, 45). Likewise, the literature showed that after a disaster, some of older adults face fast, sudden, and unexpected changes within the community, which added to some factors such as loss of community venues and feeling of grief; these factors can increase the risk of social isolation (32).

5.4. Assistance in Activities of Daily Living (ADL)

This theme is mentioned in six studies and refers to the need for assistance in activities of daily living (ADL), which are defined as activities those are necessary to carry out an independent life, such as dressing, eating, walking, and getting up from the chair. This theme also includes the need for assistance in instrumental activities of daily living (IADLs), which are more complex activities requiring a higher level of autonomy and ability to negotiate the environment by shopping, repairing damaged roofs, and managing money after disasters (2, 7, 32, 34, 38, 51). Various forms of assistance in the activities of daily living have been mentioned in the literature such as the delivery of groceries to older persons who have moved into new areas, sending taxi for helping older adults in shopping or the other outdoor activities, such as help in negotiating for repairing or rebuilding their homes, selling, and buying (34).

5.5. Resources

Another derived theme in our analysis was resources, which can be described in four sub-themes: basic needs, financial needs, assistive devices, and human resource. Re-

sources represent a human resource and the materials required by persons, communities, and organizations after natural disasters.

5.5.1. Basic Needs

Basic needs include safe water, shelter, and food. For example, food should be safe and compatible with the digestive condition of older adults (19, 39, 47).

5.5.2. Financial Resources

This type of needs include resources that help satisfy financial needs, such as monetary and non-monetary aids. An example could be the provision of job-related tools, such as seeds, traps, and agricultural tools in rural areas for older adults, as well as loans and mortgages. Some studies included in this review mentioned that many older adults could not access financial resources after disasters (7, 15, 34, 47).

5.5.3. Assistive Devices

Assistive devices encompass hearing aids, eyeglasses, wheelchairs, crutches, walkers, and other supporting technologies that help older adults perform tasks and activities that they might not otherwise be able to overcome well or at all (2, 22, 32, 33, 35, 39, 40, 42).

5.5.4. Human Resource

This need refers to trained service providers who have special skills for evacuating and displacing older adults (2, 29, 34, 36, 37).

5.6. Informational Needs

Informational needs are another deduced theme in our analysis, which includes two subthemes: access to information and tracking system.

5.6.1. Access to Information

This involves creating available and suitable messages related to risk awareness for use by older adults based on their capabilities and limitations (8, 34, 36, 46).

Information should be clear, up-to-date, and compatible with the level of education, culture, and language of older adults. Besides information about available services and what older persons can do for themselves after disasters, the combination of communication methods such as visual and auditory methods together should be applied with the elderly communications (34, 36).

5.6.2. Tracking System

The tracking system includes systems for identifying and tracking older adults after natural disasters. It also includes preparing an informational profile for each older adult. Studies mentioned several ways for tracking elderly after disasters such as registering the elderly in the initial contact after a disaster, using superannuation records and face-to-face communication, which helps identify, locate, and forecast the need for health supplies such as medication or assistive devices (8, 33, 41, 47).

5.7. Protective Needs

Protective needs encompass two subthemes and refer to standards of health care and older adult's security.

5.7.1. Health Care Standards

This subtheme contains standards for considering the needs of older adults in disaster management plans and the tasks, standards for distribution of resources, moral or legal issues, palliative care (e.g. do not resuscitate [DNR]), and guidance in the form of a specialized triage.

5.7.2. Security Needs

Security needs refer to the need for protecting older adults from mistreatment (abuse, fraud, and exploitation). Some common instances of abuse include choking, slapping, pinching, and kicking (2, 8, 29, 31, 33, 37, 38). Some studies mentioned that mistreatment might not be reported in disasters. Four studies showed that the most prominent risk factor for mistreatment after disasters is a dependency on someone else in carrying out ADL (2, 33, 34, 37). Furthermore, some factors such as being older, belonging to poor socioeconomic status, and having serious health problems could increase the risk of mistreatment with the older adults following disasters (33).

5.8. Factors Affecting Health Needs and Recovery of Older Adults

In addition to the mentioned six themes, this review identified some factors that can affect the type and quantity of the health needs of older adults after natural disasters. These factors can either increase or mitigate the health needs of older adults. They may be categorized into four types, personal, organizational, socio-cultural, and disaster-related factors.

Personal factors refer to the social, psychological, and biological status of older adults. Factors such as the presence or absence of chronic diseases, general health status, age, gender, race, marital status, and education can affect health needs (2, 6, 29, 37, 41). In addition, biography and identity, past experiences, adaptation strategies, the rate of independence, socioeconomic status, and life skills also

included in personal factors (8, 29, 37, 39, 42). For example, a relationship has been reported between disability and injuries in disasters; older persons with disabilities may have a slow initial reaction in their exposure to disasters. They may be unable to escape and need someone to help them, and their special needs may even be neglected (2, 22, 42). Women probably have a greater need to use services after natural disasters and in some communities, they are more deprived of meeting their social and economic needs. Single older adults may need more support, especially if they live alone (39). Homes of older persons may be less equipped and have a greater need for repair after disasters. Older adults living in remote and rural areas may face troubles in accessing relief supplies (34, 36, 47). Illiteracy or insufficient education may hinder fully understanding of written information and emergency messages (36). It seems poorer older adults live in unsafe houses and high-risk areas and they have fewer resources to prepare for disasters. They could be sicker and weaker than their peers who have higher incomes and more reliant on a public and charitable support (47). The type of disaster, its severity, and scope also may affect health needs (46). Socio-cultural factors such as religion, customs, and traditions, as well as values that characterize a society, can affect the types and quantity of health needs (29, 31, 46). Furthermore, the organizational attitude to aging and understanding of needs, the participation of NGOs, inter-agency cooperation, and coordination were common types of organizational factors (31).

6. Discussion

While the authors sought to understand the needs of older adults after natural disasters, there was one crosscutting observation relative to their capabilities and capacities. In fact, older adults comprise a diverse group, with an extensive range of competencies and skills. Their previous experiences and wisdom are helpful in achieving resiliency (50). Some of them can provide support of family and community to cope with and overcome difficulties related to disasters. Older persons with close ties to their community can be suitable volunteers in relief efforts and care for children and young women (48, 50). Some of the elderly can help their family economically. Young older adults retain their expertise and knowledge and can help in some roles such as teachers, nurses, and engineers. In addition, they can identify isolated older persons and care for them who are more vulnerable. They can also help identify local risks, hazards, and disaster risk-reduction strategies (34, 47, 48).

6.1. Medical Needs

Following a disaster, some problems can aggravate pre-existing medical needs. There are three main reasons for aggravating medical needs after natural disasters.

First, problems such as poor weather, lack of food and water, and stress are caused directly by disaster conditions (8, 22, 29, 33, 49). Second, problems related to an interruption in the continuity of medical services are an issue (25, 38, 42). Third, sometimes although services are available, emergency providers focus more on basic needs and there is ignorance or reluctance to deal with pre-existing medical problems (25, 29, 31, 37, 49).

The service provider should try to create a safe environment for older adults. They should also carry out environmental assessment and modification activities and provide assistive devices for older adults in a reasonable time (2, 22, 32, 33, 46, 49).

6.2. Psychosocial Needs

Another key theme was psychosocial needs. The reviewed literature generally showed two perspectives related to the psychological vulnerability of older adults and their related needs after natural disasters. The first perspective explains that older adults are more vulnerable following a natural disaster. Therefore, the majority of older adults may need psychological support (52-54). The second perspective indicates that older adults are more resilient related to their knowledge, skills, and experiences, which helps them learn effective coping strategies. Besides, they can support and comfort others who are experiencing a difficult situation after a disaster. Further research should be conducted on this subject (55-57).

Although we cannot ignore professional services, the most effective psychosocial support, especially in the early phases of the disaster, can be achieved by neighbors and the community. However, some activities such as family support of the elderly, reassuring, talking, face-to-face communication, maintaining some previous routines like choir, and intergenerational relationship can be useful for preventing social isolation (32-34, 50).

6.3. Assistance in Activities of Daily Living

Some studies indicated that one out of every four older people cannot carry out the daily activities independently after retirement age (58). After a disaster, some conditions, such as chronic diseases, declining sensory capacity, the poor performance of some organs, and compatibility disorders, can outweigh the impact of the disaster and create more dependency after the disaster (2, 32, 49).

6.4. Resources

An older person's ability to walk and do other activities, as well as their vision and hearing, is likely to decline over time. It is possible that older adults need assistive devices. Furthermore, there is a relationship between the risk of fractures, sprains or strains, and laceration and the time taken to provide assistive devices to displaced older adults after disasters (22, 35, 39).

Additionally, resources include service providers who are familiar with the special characteristics of the older adults; these characteristics may limit their activity and capacity. For example, some older persons may face abandonment or delayed and dangerous evacuation after disasters; the elderly skin is very fragile and is dragging the body; thus, their skin may be scratched or damaged while evacuating (32, 33, 40). The staff should consider their characteristics when providing services after disasters (29, 33, 37). Moreover, they should meet the needs of older adults in ways that minimize their sense of dependence; this would help them rebuild their livelihoods and businesses (29, 34).

On the other hand, deprivation of resources among older adults after disasters can be related to the lack of elderly physical ability and lack of communication; some supporting mechanisms such as formal supporting mechanisms can be useful in ensuring the access of older adults to resources (9, 19, 32, 49).

6.5. Informational Needs

After disasters, the elderly may be confused, as they have to leave their familiar surroundings, people, and neighborhoods. Understanding the alerts or following instructions during disasters could be difficult for them; in particular, those who have hearing problems or cognition disorders may also experience cognitive impairment after a disaster. Service providers should try to provide messages and alerts that best fit their abilities (8, 46).

6.6. Protective Needs

Vulnerability in older adults does not necessarily mean further damage if the vulnerability is compensated for with specific standards and thresholds (33). For instance, pod distribution can be a functional sample of the distribution standards. This is more useful than one-place distribution and leads to a lower distribution time (59). A recent study introduced a specific triage tool that triages older adults by examining four areas (cognitive state, medical needs, need for social services, and ability to perform activities daily). This is performed by a doctor or nurse and a social worker (15). Older persons are in need of changing policies from a needs-based approach toward a rights-based approach. Recruiting a gerontologist can protect the

rights of older adults and equality in various spheres of service delivery after disasters (25).

Likewise, mistreatment is an international social problem that requires urgent attention. The lack of public awareness and fear of repercussions can be a barrier to reporting mistreatment after disasters. There are three types of elderly mistreatments: abuse that imposes physical harm on the elderly or sexual assault, neglect or failure to provide services that supply basic needs like food and shelter, and exploitation by a caregiver who misuses the older adult's money or resources for their own personal benefit (2).

6.7. Factors Affecting Health Needs

Older adults are a diverse group and have various and dynamically changing needs, which should be considered by emergency relief managers. As mentioned, four types of factors affect health needs: personal, organizational, socio-cultural, and disaster-related factors. An emergency planner should keep these factors and various aspects of them in mind. For instance, although younger older adults may have different needs than their older counterparts, age is not the determining factor in disaster planning. The policymakers should also consider functional capability and impairments (37). Besides, the characteristics of the disaster can determine some health needs. High-impact disasters such as hurricane Katrina displaced over a million people. Thus, psychosocial support with regard to the evacuation was necessary for some older adults. This may not be necessary for other disasters (46). Some socio-cultural factors can facilitate meeting health needs (29, 60) such as community ties or social empathy.

Some studies found that the use of medical services by women decreased when the doctor was male and the service delivery places were located far apart; likewise psychological services were provided only to women and children because the service providers believed men did not need psychological support. These traits also were related to sociocultural factors. Moreover, some values, such as the concerns about stigma (41) and the belief that younger people prioritize the use of services, were other sociocultural factors (36). Besides, in many countries, the family provides the majority of care, support, or in-kind for older persons, but organizations should not consider an almost total responsibility of families to support and care for older persons in disasters, since disasters may exert a lot of pressure on the patterns of family care and support (47).

Our study had several limitations. It excluded studies that were not in English, searched only in some databases, and included many narrative articles in this field. There are many research gaps in this field in developing countries.

Only a small number of the studies were carried out in developing countries, even though disasters in those countries are most deadly and disruptive (46).

7. Conclusion

This study provides an important step in addressing health needs of older adults after a natural disaster. A comprehensive approach to planning for older adults after natural disasters should include the medical, psychosocial, informational, and protective needs, as well as assistance in activities of daily living and resources. Service providers need to consider personal, organizational, socio-cultural, and disaster-related factors that can affect the health needs of older adults after a natural disaster. More research is required because health needs may differ based on different cultures and contexts.

Footnotes

Conflict of Interests: The authors declare that there is no conflict of interest.

Funding/Support: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

1. WHO Centre for Health Development. *Global health expectancy research among older people*. Kobe, Japan: WHO Centre for Health Development; 2002.
2. Gutman GM, Yon Y. Elder abuse and neglect in disasters: types, prevalence and research gaps. *Int J Disast Risk Re*. 2014;**10**:38–47.
3. Riaz MN, Sultana R, Riaz MA, Shah SZ, Batool N, Murad MG. Outcomes of belief in just world among victims of natural and man-made disaster: Moderating role of resilience. *Pak J Psychol Res*. 2015;**30**(1):39.
4. Norris FH, Vanlandingham MJ, Vu L. PTSD in Vietnamese Americans following Hurricane Katrina: prevalence, patterns, and predictors. *J Trauma Stress*. 2009;**22**(2):91–101. doi: [10.1002/jts.20389](https://doi.org/10.1002/jts.20389). [PubMed: [19235888](https://pubmed.ncbi.nlm.nih.gov/19235888/)]. [PubMed Central: [PMC2923021](https://pubmed.ncbi.nlm.nih.gov/PMC2923021/)].
5. Aldrich N, Benson WF. Disaster preparedness and the chronic disease needs of vulnerable older adults. *Prev Chronic Dis*. 2008;**5**(1). A27. [PubMed: [18082016](https://pubmed.ncbi.nlm.nih.gov/18082016/)]. [PubMed Central: [PMC2248769](https://pubmed.ncbi.nlm.nih.gov/PMC2248769/)].
6. Jia Z, Tian W, Liu W, Cao Y, Yan J, Shun Z. Are the elderly more vulnerable to psychological impact of natural disaster? A population-based survey of adult survivors of the 2008 Sichuan earthquake. *BMC Public Health*. 2010;**10**:172. doi: [10.1186/1471-2458-10-172](https://doi.org/10.1186/1471-2458-10-172). [PubMed: [20353554](https://pubmed.ncbi.nlm.nih.gov/20353554/)]. [PubMed Central: [PMC2867995](https://pubmed.ncbi.nlm.nih.gov/PMC2867995/)].
7. Centers for Disease C; Prevention. Rapid assessment of the needs and health status of older adults after Hurricane Charley–Charlotte, DeSoto, and Hardee Counties, Florida, August 27–31, 2004. *MMWR Morb Mortal Wkly Rep*. 2004;**53**(36):837–40. [PubMed: [15371964](https://pubmed.ncbi.nlm.nih.gov/15371964/)].
8. Cherniack EP. The impact of natural disasters on the elderly. *Am J Disaster Med*. 2008;**3**(3):133–9. [PubMed: [18666509](https://pubmed.ncbi.nlm.nih.gov/18666509/)].
9. Aldrich N, Benson WF. Disaster Preparedness and the Chronic Disease Needs of Vulnerable Older Adults. *Prev Chronic Dis*. 2008;**5**(1). A27. [PubMed: [18082016](https://pubmed.ncbi.nlm.nih.gov/18082016/)]. [PubMed Central: [PMC2248769](https://pubmed.ncbi.nlm.nih.gov/PMC2248769/)].

10. de Boer A, Ter Horst GJ, Lorist MM. Physiological and psychosocial age-related changes associated with reduced food intake in older persons. *Ageing Res Rev*. 2013;**12**(1):316-28. doi: [10.1016/j.arr.2012.08.002](https://doi.org/10.1016/j.arr.2012.08.002). [PubMed: [22974653](https://pubmed.ncbi.nlm.nih.gov/22974653/)].
11. EM-DAT. *The International Disaster Database*. 2017. Available from: <http://www.emdat.be/classification>.
12. Lamb KV, O'Brien C, Fenza PJ. Elders at risk during disasters. *Home Healthc Nurse*. 2008;**26**(1):30-8. quiz 39-40. doi: [10.1097/01.NHH.00000305552.32597.4d](https://doi.org/10.1097/01.NHH.00000305552.32597.4d). [PubMed: [18158490](https://pubmed.ncbi.nlm.nih.gov/18158490/)].
13. Hutton D. *Older people in emergencies: considerations for action and policy development*. Geneva, Switzerland: World Health Organization; 2008.
14. United Nations Interagency Standing Committee. *Inter-Agency Standing Committee (IASC) Guidelines on mental health and psychosocial support in emergency settings*. Geneva, Switzerland: IASC; 2007.
15. Dyer CB, Regev M, Burnett J, Festa N, Cloyd B. SWIFT: a rapid triage tool for vulnerable older adults in disaster situations. *Disaster Med Public Health Prep*. 2008;**2** Suppl 1:S45-50. doi: [10.1097/DMP.0b013e3181647b81](https://doi.org/10.1097/DMP.0b013e3181647b81). [PubMed: [18769267](https://pubmed.ncbi.nlm.nih.gov/18769267/)].
16. Adelman DS, Legg TJ. Caring for older adults with dementia when disaster strikes. *J Gerontol Nurs*. 2010;**36**(8):13-7. doi: [10.3928/00989134-20100701-01](https://doi.org/10.3928/00989134-20100701-01). [PubMed: [20669858](https://pubmed.ncbi.nlm.nih.gov/20669858/)].
17. Alipour F, Khankeh H, Fekrazad H, Kamali M, Rafiey H, Ahmadi S. Social issues and post-disaster recovery: A qualitative study in an Iranian context. *Int Soc Work*. 2015;**58**(5):689-703.
18. Kent G. The human right to disaster mitigation and relief. *Env Hazards*. 2001;**3**(3-4):137-8. doi: [10.3763/ehaz.2001.0315](https://doi.org/10.3763/ehaz.2001.0315).
19. Mudur G. Aid agencies ignored special needs of elderly people after tsunami. *BMJ*. 2005;**331**(7514):422. doi: [10.1136/bmj.331.7514.422](https://doi.org/10.1136/bmj.331.7514.422). [PubMed: [16110070](https://pubmed.ncbi.nlm.nih.gov/16110070/)]. [PubMed Central: [PMC1188103](https://pubmed.ncbi.nlm.nih.gov/PMC1188103/)].
20. Binder SB, Baker CK, Mayer J, O'Donnell CR. Resilience and Recovery in American Samoa: A Case Study of the 2009 South Pacific Tsunami. *J Community Psychol*. 2014;**42**(7):799-822. doi: [10.1002/jcop.21654](https://doi.org/10.1002/jcop.21654).
21. Khankeh HR, Khorasani-Zavareh D, Johanson E, Mohammadi R, Ahmadi F, Mohammadi R. Disaster health-related challenges and requirements: a grounded theory study in Iran. *Prehosp Disaster Med*. 2011;**26**(3):151-8. doi: [10.1017/S1049023X11006200](https://doi.org/10.1017/S1049023X11006200). [PubMed: [21929828](https://pubmed.ncbi.nlm.nih.gov/21929828/)].
22. Eldar R. The Needs of Elderly Persons in Natural Disasters: Observations and Recommendations. *Disasters*. 1992;**16**(4):355-8. doi: [10.1111/j.1467-7717.1992.tb00416.x](https://doi.org/10.1111/j.1467-7717.1992.tb00416.x).
23. Guha-Sapir D, Vos F, Below R. *Annual Disaster Statistical Review 2010*. Brussels, Belgium: Centre for Research on the Epidemiology of Disasters (CRED); 2012.
24. Kessler RC, Keane TM, Ursano RJ, Mokdad A, Zaslavsky AM. Sample and design considerations in post-disaster mental health needs assessment tracking surveys. *Int J Methods Psychiatr Res*. 2008;**17** Suppl 2:S6-S20. doi: [10.1002/mpr.269](https://doi.org/10.1002/mpr.269). [PubMed: [19035440](https://pubmed.ncbi.nlm.nih.gov/19035440/)]. [PubMed Central: [PMC3081100](https://pubmed.ncbi.nlm.nih.gov/PMC3081100/)].
25. Rutkow L, Vernick JS, Spira AP, Barnett DJ. Using the law to promote the mental health of older adults during disasters. *J Law Med Ethics*. 2013;**41** Suppl 1:80-3. doi: [10.1111/jlme.12046](https://doi.org/10.1111/jlme.12046). [PubMed: [23590748](https://pubmed.ncbi.nlm.nih.gov/23590748/)].
26. World Health Organization. *Community Health Needs Assessment: An Introductory Guide for the Family Health Nurse in Europe*. WHO; 2001.
27. Fineout-Overholt E, Melnyk BM, Stillwell SB, Williamson KM. Evidence-based practice, step by step: Critical appraisal of the evidence: part III. *Am J Nurs*. 2010;**110**(11):43-51. doi: [10.1097/01.NAJ.00000390523.99066.b5](https://doi.org/10.1097/01.NAJ.00000390523.99066.b5). [PubMed: [20980899](https://pubmed.ncbi.nlm.nih.gov/20980899/)].
28. Annear MJ, Wilkinson T, Keeling S. Psychological challenges among older adults following the Christchurch earthquakes. *J Disaster Research*. 2013;**8**(3):508-11.
29. Ardalan ALI, Mazaheri M, Naieni KH, Rezaie M, Teimoori F, Pourmalek F. Older people's needs following major disasters: a qualitative study of Iranian elders' experiences of the Bam earthquake. *Ageing Soc*. 2009;**30**(1):11-23. doi: [10.1017/S0146686X09990122](https://doi.org/10.1017/S0146686X09990122).
30. Campbell J. Introduction Applying the 'Disaster Lens' to Older Adults. *Generations*. 2007;**31**(4):5-7.
31. Chan EYY, Griffiths S. Comparison of Health Needs of Older People between Affected Rural and Urban Areas after the 2005 Kashmir, Pakistan Earthquake. *Prehosp and Disaster Med*. 2012;**24**(5):365-71. doi: [10.1017/S1049023X00007159](https://doi.org/10.1017/S1049023X00007159).
32. Claver M, Dobalian A, Fickel JJ, Ricci KA, Mallers MH. Comprehensive care for vulnerable elderly veterans during disasters. *Arch Gerontol Geriatr*. 2013;**56**(1):205-13. doi: [10.1016/j.archger.2012.07.010](https://doi.org/10.1016/j.archger.2012.07.010). [PubMed: [22901664](https://pubmed.ncbi.nlm.nih.gov/22901664/)].
33. Cloney E, Dyer CB. Catastrophic events and older adults. *Crit Care Nurs Clin North Am*. 2010;**22**(4):501-13. doi: [10.1016/j.ccell.2010.10.003](https://doi.org/10.1016/j.ccell.2010.10.003). [PubMed: [21095558](https://pubmed.ncbi.nlm.nih.gov/21095558/)].
34. Davey JA, Neale J. *Earthquake preparedness in an ageing society: Learning from the experience of the Canterbury Earthquakes*. Earthquake Commission; 2013.
35. Elmore D, Brown L. Emergency preparedness and response: health and social policy implications for older adults. *Generations*. 2007;**31**(4):66-74.
36. Gibson MJ, Hayunga M. *We can do better: lessons learned for protecting older persons in disasters*. Washington: AARP; 2006.
37. Johnson HL, Ling CG, McBee EC. Multi-disciplinary Care for the Elderly in Disasters: An Integrative Review. *Prehosp Disaster Med*. 2015;**30**(1):72-9. doi: [10.1017/S1049023X14001241](https://doi.org/10.1017/S1049023X14001241). [PubMed: [25407496](https://pubmed.ncbi.nlm.nih.gov/25407496/)].
38. Lavin RP, Schemmel-Rettenmeier L, Frommelt-Kuhle M. Reconsidering "special needs" populations during a disaster. *Annu Rev Nurs Res*. 2012;**30**(1):125-47. doi: [10.1891/0739-6686.30.125](https://doi.org/10.1891/0739-6686.30.125). [PubMed: [24894055](https://pubmed.ncbi.nlm.nih.gov/24894055/)].
39. McGuire LC, Ford ES, Okoro CA. Natural disasters and older US adults with disabilities: implications for evacuation. *Disasters*. 2007;**31**(1):49-56. doi: [10.1111/j.1467-7717.2007.00339.x](https://doi.org/10.1111/j.1467-7717.2007.00339.x). [PubMed: [17367373](https://pubmed.ncbi.nlm.nih.gov/17367373/)].
40. Pekovic V, Seff L, Rothman M. Planning for and responding to special needs of elders in natural disasters. *Generations*. 2007;**31**(4):37-41.
41. Prueksaritanond S, Kongsakol R. Biopsychosocial impacts on the elderly from a tsunami-affected community in southern Thailand. *J Med Assoc Thai*. 2007;**90**(8):1501-5. [PubMed: [17926976](https://pubmed.ncbi.nlm.nih.gov/17926976/)].
42. Rosenkoetter MM, Covan EK, Cobb BK, Bunting S, Weinrich M. Perceptions of older adults regarding evacuation in the event of a natural disaster. *Public Health Nurs*. 2007;**24**(2):160-8. doi: [10.1111/j.1525-1446.2007.00620.x](https://doi.org/10.1111/j.1525-1446.2007.00620.x). [PubMed: [17319888](https://pubmed.ncbi.nlm.nih.gov/17319888/)].
43. Rothman M, Brown L. The vulnerable geriatric casualty: medical needs of frail older adults during disasters. *Generations*. 2007;**31**(4):16-20.
44. Tuohy R, Stephens C. Older adults' narratives about a flood disaster: Resilience, coherence, and personal identity. *J Aging studies*. 2012;**26**(1):26-34.
45. Tuohy R, Stephens C. Exploring older adults' personal and social vulnerability in a disaster. *Int J Emergen Management*. 2011;**8**(1):60-73.
46. Uscher-Pines L. Health effects of relocation following disaster: a systematic review of the literature. *Disasters*. 2009;**33**(1):1-22. doi: [10.1111/j.1467-7717.2008.01059.x](https://doi.org/10.1111/j.1467-7717.2008.01059.x). [PubMed: [18498372](https://pubmed.ncbi.nlm.nih.gov/18498372/)].
47. World Health Organization. *Older Persons in Emergencies: An Active Ageing Perspective*. World Health Organization; 2008.
48. Haynes M. *Report: Seniors vulnerable in times of disaster*. 44. American Public Health Association; 2014.
49. Henderson TL, Roberto KA, Kamo Y. Older Adults' Responses to Hurricane Katrina. *J Appl Gerontol*. 2009;**29**(1):48-69. doi: [10.1177/0733464809334287](https://doi.org/10.1177/0733464809334287).
50. HelpAge International. *Disaster resilience in an ageing world: How to make policies and programmes inclusive of older people*. London, UK: HelpAge International; 2014.
51. Ardalan A, Mazaheri M, Mowafi H, Vanrooyen M, Teimoori F, Abbasi R. Impact of the 26 December 2003 Bam Earthquake on activities of daily living and instrumental activities of daily living of older people. *Prehosp Disaster Med*. 2011;**26**(2):99-108. doi: [10.1017/S1049023X11000045](https://doi.org/10.1017/S1049023X11000045). [PubMed: [21888729](https://pubmed.ncbi.nlm.nih.gov/21888729/)].

52. Fernandez LS, Byard D, Lin CC, Benson S, Barbera JA. Frail elderly as disaster victims: emergency management strategies. *Prehosp Disaster Med.* 2002;**17**(2):67-74. [PubMed: [12500729](#)].
53. Phifer JF. Psychological distress and somatic symptoms after natural disaster: differential vulnerability among older adults. *Psychol Aging.* 1990;**5**(3):412-20. [PubMed: [2242245](#)].
54. McCurry SM, Gibbons LE, Bond GE, Rice MM, Graves AB, Kukull WA, et al. Older adults and functional decline: a cross-cultural comparison. *Int Psychogeriatr.* 2002;**14**(2):161-79. [PubMed: [12243207](#)].
55. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry.* 2002;**65**(3):207-39. [PubMed: [12405079](#)].
56. Toner JA, Mierswa TM, Howe JL. *Geriatric Mental Health Disaster and Emergency Preparedness.* Springer Publishing Company; 2010.
57. Rafiey H, Momtaz YA, Alipour F, Khankeh H, Ahmadi S, Sabzi Khoshnami M, et al. Are older people more vulnerable to long-term impacts of disasters? *Clin Interv Aging.* 2016;**11**:1791-5. doi: [10.2147/CIA.S122122](#). [PubMed: [27994445](#)]. [PubMed Central: [PMC5153288](#)].
58. Staurant M, Wandenbos G. *Geriatric psychiatric.* New York: Springer; 1994.
59. Benson WF, Aldrich N. CDC's disaster planning goal: protect vulnerable older adults. *CDC Health Aging Program.* 2007.
60. Alipour F, Khankeh HR, Fekrazad H, Kamali M, Rafiey H, Sarrami Foroushani P, et al. Challenges for resuming normal life after earthquake: a qualitative study on rural areas of iran. *PLoS Curr.* 2014;**6**. doi: [10.1371/currents.dis.b4e84b942500e2f8f260f3471b7ee815](#). [PubMed: [25685625](#)]. [PubMed Central: [PMC4323411](#)].