

Review Article

Rehabilitation of vulnerable groups in emergencies and disasters: A systematic review

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BACKGROUND: Natural and man-made disasters, especially those occurring in large scales not only result in human mortality, but also cause physical, psychological, and social disabilities. Providing effective rehabilitation services in time can decrease the frequency of such disabilities. The aim of the current study was to perform a systematic review related to rehabilitation of vulnerable groups in emergencies and disasters.

METHODS: The systematic review was conducted according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. The key words "recovery", "rehabilitation", "reconstruction", "transformation", "transition", "emergency", "disaster", "crisis", "hazard", "catastrophe", "tragedy", "mass casualty incident", "women", "female", "children", "pediatric", "disable", "handicap", "elder", "old" and "vulnerable" were used in combination with Boolean operators OR and AND. ISI Web of Science, PubMed, Scopus, Science Direct, Ovid, ProQuest, Wiley, Google Scholar were searched.

RESULTS: In this study a total of 11 928 articles were considered and 25 articles were selected for final review of rehabilitation of vulnerable groups based on the objective of this study. Twenty-five studies including six qualitative, sixteen cross-sectional and three randomized controlled trials were reviewed for rehabilitation of vulnerable groups in emergencies and disasters. Out of the selected papers, 23 were studied based on rehabilitation after natural disasters and the remaining were man-made disasters. Most types of rehabilitation were physical, social, psychological and economic.

CONCLUSION: The review of the papers showed different programs of physical, physiological, economic and social rehabilitations for vulnerable groups after emergencies and disasters. It may help health field managers better implement standard rehabilitation activities for vulnerable groups.

KEY WORDS: Rehabilitation; Vulnerable group; Emergencies; Disasters

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INTRODUCTION

World Health Organization (WHO) defines disasters as a situation that causes inconsistency in social or community performance resulting in extensive humanitarian, economic or environmental damages.^[1] Disaster management consists of four phases including prevention and mitigation, preparedness, response and rehabilitation.^[2] Rehabilitation

is defined as performing health care with the goal of restoring, maintaining or improving routine life skills of individuals with disabilities caused due to disease, accidents or incidents.^[3] In disaster situations categories of rehabilitation could be physical, psychological, social, spiritual, and economic.^[4]

In general, women, children, elderly and disabled

people are more vulnerable when compared with adult men, resulting in a lower capacity of adaptation and survival in emergencies and disasters.^[5] National Disaster Response Force (NDRF) reported elderly, children and disable people and emphasized rehabilitation immediately after disasters.^[6] When coping with disasters or emergencies conditions, vulnerable people can face several additional problems, which increase their risk for symptoms such as abrupt onset of intense fear, vertigo, insomnia or even psychoses. Therefore, it is necessary for authorities to establish psychological consult clinics to help with adaptation and encourage them to cope with these symptoms.^[7]

After emergencies and disasters, the most important economic rehabilitation action will restore vulnerable groups and improve family's livelihoods.^[8] Studies conducted years after occurrence of disasters typically show that the society's progress is affected at a large-scale, but significant issues are often ignored in relation to vulnerable groups in society.^[9] The aim of the study was to perform a systematic review of rehabilitation activities for vulnerable groups during emergencies and disasters, including economical, physical, spiritual, psychological and social activities. The results of the current study may help health field managers better implement standard rehabilitation plans for vulnerable groups.

METHODS

The present study was a systematic review of publications relating to rehabilitation of vulnerable groups in emergencies and disasters. The study performed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.^[10]

Search strategy

This study conducted during November 2015 reviewed published English papers in the field of vulnerable group's rehabilitation in emergencies and disasters. For this purpose, we studied database including ISI Web of Science, PubMed, Scopus, Science Direct, Ovid, ProQuest, Wiley and Google Scholar from January 1, 2000 to October 22, 2015. The search key words included "recovery", "rehabilitation", "reconstruction", "transformation", "transition", "emergency", "disaster", "crisis", "hazard", "catastrophe", "tragedy", "mass casualty incident", "women", "female", "children", "pediatric", "disable", "handicap", "elder", "old" and "vulnerable". Using OR and AND, key words were combined and

written in search box of databases included [(recovery OR rehabilitation OR reconstruction OR transformation OR transition) AND (emergency OR disaster OR crisis OR hazard OR catastrophe OR tragedy OR mass casualty incident) AND (women OR female OR children OR pediatric OR disable OR handicap OR elder OR old OR vulnerable)]. All synonyms of the key words were included using MESH strategies.

Selection of articles and document

Independent reviewers (HS and FR) screened abstracts and titles for eligibility. When the reviewers felt that the abstract or title was potentially useful, full copies of the article were retrieved and considered for eligibility by both reviewers. If discrepancies occurred between reviewers, the reasons were identified and a final decision was made based on third reviewer (MM). Two authors (HS and MY) assessed the methodology quality and grade of evidence of included studies with the Critical Appraisal Skills Program (CASP) tools.^[11,12] The CASP tools uses a systematic approach to appraise different study designs from the following domains: study validity, methodology quality, presentation of results, and external validity and each of the items from the checklists were judged with yes (low risk of bias, score 1), no (high risk of bias), or cannot tell (unclear or unknown risk of bias, score 0). Total scores were used to grade the methodologic quality of each study.^[11,12]

Inclusion and exclusion criteria

We included papers that had at least one of the rehabilitation categories, at least one the vulnerable groups, and published paper in years of 2000 and after.

Database search

The initial electronic database search of the literature resulted in a total of 11 928 documents. At the next step, duplicated, books, dissertations, presentations were excluded and the number of documents decreased to 632 articles. Based on systematic screening, at the first stage we reviewed the titles and abstracts to find those related to rehabilitation of vulnerable groups in emergencies and disasters and we extracted 63 eligible articles. In the next step, all 63 selected full text papers were considered and finally 25 papers (6 qualitative, 16 cross-sectional and 3 randomized controlled trial studies) which reported rehabilitation of vulnerable groups in emergencies and disasters were selected. Figure 1 shows the search strategy and the selected articles in accordance with the PRISMA guidelines.^[10]

Study quality assessment

Quality assessment of the included studies were done using the (CASP) tools.^[11,12] The score of qualitative and quantitative studies ranged from 3 to 8 and 2 to 7 respectively. Studies did not report any rehabilitation programs duration after disasters. The majority of quantitative studies did not provide any ethical statement, study design, sampling and reflexivity related to research

process. In the cross-sectional studies, only five out of sixteen articles^[19,22,26,27,34] used appropriate methods. The majority of them also did not consider important confounding factors. None of the randomized controlled trial articles reported blinding of participants or assessors and two studies^[35,36] lacked a control group. More details have shown in Table 1.

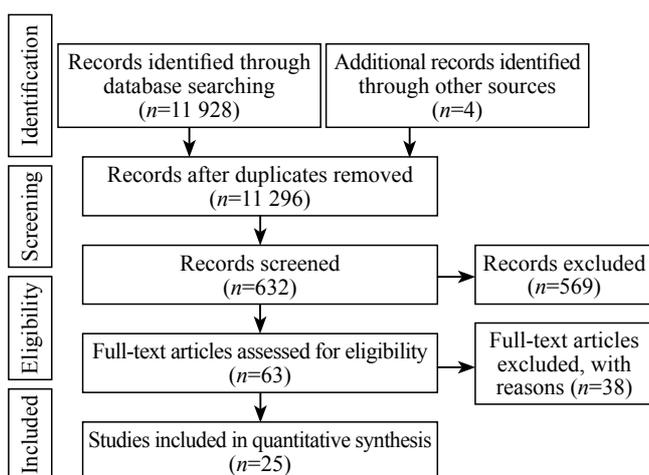


Figure 1. Flow diagram showing selection of articles reviewed, in accordance with the PRISMA Guidelines 10.

RESULTS

Demographics

Number of participants of these twenty-five studies were 3 879 in total, which consist of 1 347 females, 145 children, 217 the elderly and 1 517 the disabled. Details of each study and their special features were reported regarding authors, year, study type, vulnerable group, sample size, type of rehabilitation, setting and duration of rehabilitation, disaster type, and main concepts. The studies were mainly conducted in Asian countries and United States, including India,^[15,19,20,25-27,31] China,^[18,22,23,34,36,37] Pakistan,^[16,28,30] Iran,^[13,17,21] Indonesia,^[29,32] Sri Lanka^[35] and United States.^[14,24,33] The results of the studies showed that 56% of the studies are about rehabilitation programs for women, 32% is for children, 24% is for elderly, and 16% is for disabled people. Each study included more than one

Table 1. The quality of the final extracted articles using Critical Appraisal Skills Program (CASP)^[11,12]

Randomized controlled trial	Clear focused issue	Adequate randomization procedure	Participants properly accounted	Blinding of participants/ assessors	Groups similar at start	Groups treated equally	Large treatment effect	Precise treatment effect	Clinically important outcomes considered	Benefits worth harms and costs	CASP Grade
Berger et al ^[35] (2009)	+	-	+	-	-	-	+	+	+	-	5/10
Zhang et al ^[36] (2013)	+	-	+	-	-	+	-	-	+	+	5/10
Zang et al ^[37] (2013)	+	+	+	-	+	+	+	+	+	-	8/10
Cross-sectional studies	Clear focused issue	Appropriate method	Appropriate cohort recruitment	Exposure accurately measured	Outcome accurately measured	Important confounding factors accounted	Adequate follow-up	Strong exposure and outcome relation	Precise results	Believe the results	CASP Grade
Edgar et al ^[32] (2006)	+	-	-	+	+	-	+	+	+	-	6/10
Jothi et al ^[19] (2011)	+	-	-	+	+	-	-	+	-	+	5/10
Becker ^[20] (2006)	+	-	+	+	+	+	-	+	-	+	5/10
Chiou-Tan et al ^[33] (2007)	+	+	-	-	+	-	-	+	-	+	7/10
Rauch et al ^[24] (2011)	+	-	-	+	+	-	+	+	-	+	6/10
Becker ^[27] (2009)	+	+	-	-	+	-	-	-	-	-	3/10
Math et al ^[26] (2008)	+	+	-	-	+	-	+	-	-	+	5/10
Mallick et al ^[28] (2010)	+	-	-	+	+	-	+	+	-	+	6/10
Raissi ^[21] (2007)	+	-	-	+	+	-	-	-	-	-	4/10
Régnier et al ^[29] (2008)	+	-	-	+	+	-	+	+	+	-	6/10
Rathore et al ^[30] (2008)	+	-	-	+	+	-	-	+	+	+	6/10
Bazeghi et al ^[17] (2010)	+	-	-	-	+	-	-	+	-	+	4/10
Ni et al ^[34] (2013)	+	+	+	-	-	-	-	+	+	-	5/10
Xiao et al ^[23] (2011)	+	-	+	-	-	-	+	+	-	-	4/10
Li et al ^[22] (2012)	+	+	-	-	-	-	+	+	+	-	4/10
Tan et al ^[25] (2006)	+	-	-	-	-	-	-	-	-	+	2/10
Qualitative studies	Study aim	Methodology	Study design	Sampling	Data collection	Reflexivity	Ethical issues	Data analysis	Findings	Value of the research	CAS Grade
Khankeh et al ^[13] (2013)	+	+	+	+	+	-	-	+	+	+	8/10
Adams et al ^[14] (2011)	+	+	-	-	-	-	-	+	-	-	3/10
Bazeghi et al ^[17] (2010)	+	-	-	-	+	-	-	+	-	+	4/10
Mansoor et al ^[16] (2013)	+	+	-	-	+	-	+	+	+	+	7/10
Larson et al ^[15] (2015)	+	+	-	+	+	-	-	+	-	+	6/10
Huang et al ^[18] (2013)	+	+	-	-	-	-	-	-	-	+	3/10

Abbreviations: yes (+), no (-);

vulnerable group. The mean of the period of physical, psychological, social, and economic rehabilitation programs was about 7.3 months varying from 1 week to 50 months, which were based on the type of the disaster and the countries where the disaster occurred. For instance, psychological rehabilitation period after hurricane Katrina in the USA was about 1 week, and physical and psychological rehabilitation period after an earthquake in China was about 50 months.

Among all rehabilitation programs implemented after the disaster, 52% of them were for physical rehabilitation, 48% were for psychological rehabilitation, 52% were for social rehabilitation, and 12% of them were for economic rehabilitation. That means each study had more than one type of rehabilitation program. The results of the studies also showed that the countries implemented a wide range of rehabilitation programs for vulnerable groups after the onset of the disasters, but the exact starting time of the programs were not declared. Rehabilitation activities were conducted at different locations such as hospitals, clinics, schools, temporary camps by rehabilitation teams from local (84%) and international (16%) governmental and non-governmental organizations including UNICEF, WHO, and World Bank (IBRD).

Main results

Studies showed no difference between the nature of the implementation of rehabilitation programs and activities based on the type of the disaster and different vulnerable groups. The most important common strategy for vulnerable groups for physical rehabilitation include immediate and early implementation of physical rehabilitation immediately after the response stage and to continue these actions in the society after victims discharge from health centers. Important strategies for psychological rehabilitation include early medical intervention and consultation for all vulnerable groups, focusing on a cooperation approach of the vulnerable groups with the same sex and the same age in order to remove the negative experience and tension especially in women and children.

Strategies for social rehabilitation include emphasis on the participation of the vulnerable groups in the planning and implementation of services and activities from the day after the disaster. These strategies are based on holding proper training courses by local and international organizations especially local media in order to increase the capacity and potency of the people and the society. Strategies for economic rehabilitation include emphasizing the importance of women's role as

a financial source in the family by providing them with small businesses, providing families with low-interest loans by international organizations, and providing societies with local businesses based on the culture of the damaged society by the World Bank. Moreover, the summaries of each paper related to rehabilitation of vulnerable groups in emergencies and disasters are shown in Table 2.

DISCUSSION

This systematic review provides an overview of various type of rehabilitation for vulnerable group in emergencies and disasters. This review includes 25 studies (6 qualitative, 16 cross-sectional and 3 randomized controlled trial). Most interventions evaluated in these studies were complex and included more than one active rehabilitation component. The most common kinds of rehabilitation intervention for vulnerable group were physical, social, and psychological activities.

The studies showed that the duration of the implementation of the rehabilitation programs after the onset of the disaster ranged from 1 week to 50 months and the mean of this period is about 7 months. The studies also showed that local public and private organizations performed 84% of the rehabilitation interventions, and international organizations performed 16% of these interventions. These findings are in line with the WHO guideline, which states that the success of the rehabilitation programs after the disaster depends on potential of the damaged area in meeting their needs independent of external aids and supports of non-local organizations.^[40] The disaster management experts believe both natural disasters and human-made disasters lead to physical, economic, and social damages,^[13,19] and there was no difference in the nature and implementation of rehabilitation programs based on vulnerable groups.

The important result shows physical and psychological rehabilitation programs started immediately after the response phase, which would better preserve function of body organs and cause less psychological signs and symptoms.^[36,37] Disaster management experts believe that physical and physiological rehabilitation should be immediately started after response phase to disaster and it should continue in the community over the long term in order to improve and restore function of vulnerable peoples.^[13,38,39]

One of the studies emphasized social rehabilitation of vulnerable groups in order to ensure the participation of vulnerable groups in the planning and implementation

Table 2. Summary of papers related to rehabilitation of vulnerable groups in emergencies and disasters

Authors	Study type	Vulnerable group	Sample size	Disaster type		Location	Type rehabilitation	Setting	Post disaster (phase)	Duration	Main concept
				Natural	Man-made						
Qualitative studies analyzes											
Khankeh et al ^[5] (2013)	Qualitative	Women	10	Earthquake		Iran	Physical, psychological, social	Community	No detail	No detail	This study extracted the three following concepts: (1) needs for health recovery; (2) intent to delegate responsibility; and (3) desire for a wide scope of social support. One of the most important weaknesses of rehabilitations from participants' viewpoint was that after the response stage where people were rescued and discharged, there were no specialized centers to continue long-term rehabilitation activities. Also after the occurrence of a disaster, authorities' sensitiveness decreases and few disaster news was reported on the local media. Participants said that after disaster and destruction of their houses, they were kept in long-term shelters that could impose a variety of mental and psychological traumas. An important finding of this paper is that performing rehabilitation activities require cooperation from public and private sectors, and governmental organizations cannot conduct appropriate rehabilitation for injured individuals. Furthermore, local authorities' role in restoring the injured to pre-disaster conditions in total rehabilitation phase is of high importance. Social rehabilitation activates include: older participants in treatment process and help to obtain authority and reinforcement, individual and family supports, communicate between resources and needs of the elderly and also help to access these resources, identify skills, competencies and specialization of elderly. Result of this article showed the elderly with high blood pressure, cardiac conditions, diabetes, kidney disease and cancer were unable to receive regular care. After Katrina hurricane many elderly people with chronic conditions did not get treatment for long periods of time, others were unable to receive regular checkups or obtain medications. Many elderly people died from lack of medication for chronic conditions, especially diabetes, hypertension, and asthma. Rehabilitation activates include formation of self-help groups, consisting of 8 to 10 individuals. The major role was to decrease poverty disaster-affected women. Results showed that value and dignity of women and men were not the same before and after tsunami. Men worked and women just took care of children, but after formation of self-help groups following the tsunami, drastic changes occurred in women's roles; they could also work outside of the home. Increasing the number of self-help groups was a major rehabilitation activity which could get a huge amount of international humanitarian helps. Self-help groups offered low interest loans to the affected women. The good thing about this loan was that every family was paid with a monthly amount regarding their financial status. For social rehabilitation, women participate in development activates that designed based on social partnership, and identify skills and competencies in order to perform appropriate and correct social rehabilitation programs in families and society. Disasters may have negative impacts on children who witnessed the tragedy and lost their family members. These negative impacts include sleep disorders, social isolation, and posttraumatic stress disorder. One of the most important results of this study was that there should not be any gap between response phase and rehabilitation phase for children. Since there is a gap, the rehabilitation procedures are difficult. Rehabilitation activities used for children include asking them to speak about their feelings and sadness. Children are generally interested to speak with others of their own age; therefore this opportunity should be provided for them to meet school friends and teachers that can decrease their anxiety and stress.
Adams et al ^[4] (2011)	Qualitative	The elder	165	Hurricanes		United States	Social	No detail	No detail	No detail	
Larson et al ^[6] (2015)	Qualitative	Women	57	Tsunami		India	Social, economical	Affected setting	Long term	No detail	
Mansoor et al ^[6] (2013)	Qualitative	Children	18	Flood, earthquake		Pakistan	Psychological	Orphanages	Long term	No detail	
Bazeghi et al ^[7] (2010)	Qualitative	Children	25	Earthquake		Iran	Economical, social	Governmental and non-governmental in Iran	Long term	After disaster	The Iranian Red Crescent Organization, Emdad Imam Khomeini Committee (a national organization unique to Iran that is protected by the government and supported by public contributions) and Behzisti organization (the government welfare organization in Iran) are the main organizations involved in the management of separated and unaccompanied children, following disasters in Iran. NGOs are rarely responsible for caring for unaccompanied children; however they provide valuable support including financial assistance, arrangement of educational and extra-curricular activities, and psychosocial support like participating in art activities such as painting, embroidery, doll making for girls and various sports activities for boys such as football.

Authors	Study type	Vulnerable group	Sample size	Disaster type	Man-made	Location	Type rehabilitation	Setting	Post disaster (phase)	Duration	Main concept
Huang et al ^[8] (2013)	Qualitative	The Older and women	24	Earthquake		China	Social	Community centers	Long term	Once a week (60–90 minutes); 9 total sessions	Social rehabilitation programs include: various group activities, promotion of harmony among members and fostered group leaders; and communication with other groups outside the community. Most participants indicated no distance in thinking about the earthquake. Women declared that joining the social group life was meaningful. After joining the group, participants' social networks were broadened and strengthened, and they recognized the importance of mutual understanding and developed a sense of cooperation.
Cross-sectional studies analyzes											
Jothi et al ^[9] (2011)	Cross-sectional	Women	200	Tsunami		India	Social and educational	Affected community	3–28 days	No detail	Nature of disasters can cause great changes in economic and psychological aspects of women's lives. This paper showed women preferred TV to other medias to know about disaster news. So, TV can play a major role in teaching social rehabilitating activities to injured individuals particularly women. The study found that one of the good points about TV was the first-hand information about disaster and its following rehabilitation activities. Another role of media was to identify and introduce centers and social supporting institutions, and also to advise and guide women's to social services related with health at the community level after disasters.
Becker ^[20] (2006)	Cross-sectional	Children and the elder	No detail	Tsunami		India	Psychological and social (educational) camps	Temporary housing	Long term	First 3 months after the disaster	Social and psychological rehabilitations activities for adults and children include: helping them talk about their feelings to others to correct their understanding from disaster, as well as accepting the changes to their bodies and mentalities caused by that incident; decreasing physical, psychological and social symptoms; strengthening relaxation; discharging excitements with using proper proverbs, and strengthening social cohesion through social activities and support group. Authorities held some group meetings with children at school to comfort their experiences, and created supporting groups to help them speak their anxiety about the loss of schools, teachers, and their academic records.
Raissi ^[21] (2007)	Case study	The disabled	54	Earthquake		Iran	Physical, educated (social)	Clinic, setting effected	4–12 weeks	3 months	This study reported important obstacles for physical rehabilitation procedures. These factors include: lack of accurate information, spreading the residents of Bam to other parts of the country, lack of skilled staff, loss of previous information due to earthquake, transferring the injured people for several times and destruction of addresses and maps. Another important finding is that a designed intervention of physical rehabilitation should be consider as the role of their participation. One of the important indicators which is proper to physical rehabilitation programs is that religious, social, cultural and economic factors should be considered for affected people. Not knowing cultural viewpoints of patients and lack of ability to communicate with them is the main weaknesses of rehabilitation service providers. So, training local staff and using them for providing physical rehabilitations activates can lead to providing better, faster services with lower cost and more longer term.
Li et al ^[22] (2012)	Prospective cohort study	Women	51	Earthquake		China	Physical	Hospital	0–72	3 months	Most victims rescued from the debris within 30 minutes after the earthquake (70.6%), and all surviving victims rescued within 9 hours. 86.3% patients received surgical spinal stabilization, only 7 patients underwent surgery within 5 days after the earthquake. 94.1% patients began rehabilitation therapy within 4 months. 90% patients resumed to walk using orthoses; 90.2% used a wheelchair. Patient unadjusted/raw MBI scores improved significantly (mean difference, 29±16.9 points) during the rehabilitation program. At the end of therapy, 35% patients achieved moderate ADL independence, and 90.2% regained some self-care ability. Rehabilitation program was the strongest predictor of significantly increased MBI scores (increase of 34 points; 95%CI 28–41). Complications included bowel and bladder dysfunction (60.8% and 58.8%, respectively); 63% (pressure ulcers) to 85% (deep vein thrombosis). Earlier rescue and rehabilitation were significant positive predictors of rehabilitation effectiveness. Individualized rehabilitation program was provided by multidisciplinary rehabilitation team, comprised of physiatrists, therapists (physical, occupational, traditional modalities), rehabilitation nurses, volunteers, and other consulting medical specialists. Rehabilitation modalities included exercises, muscle strengthening, transfers, training ADL, and mobility training; ultrasound, functional electrical stimulation, electrotherapy, infrared, and lymphatic flow modalities; traditional Chinese therapies (acupuncture, massage); education in management of bladder and bowel continence, skin care, and self-exercise; and assistive devices (prostheses, orthoses) prescribed and provided if indicated.

Authors	Study type	Vulnerable group	Sample size	Disaster type	Man-made	Location	Type rehabilitation	Setting	Post disaster (phase)	Duration	Main concept
Xiao et al ^[23] (2011)	Cross-sectional	Women	174	Natural	Earthquake	China	Physical	Hospital, rehabilitation facilities	4–12 weeks	Two 40-minute sessions per day for >1 month	Rehabilitation interventions delivered by physiotherapists, which included muscle strengthening exercises, joint mobilization and muscle stretching to improve ROM, standing and walking exercises, pain and scar treatment, and other electromagnetic and heat treatments as necessary. Functional recovery was positively associated with rehabilitation intervention (<i>OR</i> =5.3; 95% <i>CI</i> 2.4–11.7), but it was negatively correlated with the immobilization duration (<i>OR</i> per 10-d increase=0.87; 95% <i>CI</i> 0.80–0.95), age (<i>OR</i> per 10-y increase=0.54; 95% <i>CI</i> 0.42–0.71), and depressive symptomatology (<i>OR</i> =0.21; 95% <i>CI</i> 0.06–0.72). Institution-based rehabilitation interventions delivered by physiotherapists, which included muscle strengthening exercises, joint mobilization and muscle stretching to improve ROM, standing and walking exercises, pain/scar treatment, and other electromagnetic and heat treatments as necessary.
Rauch et al ^[24] (2011)	Cross-sectional	Women	18	Earthquake	United States	Physical, psychological	Haiti Hospital Appeal (HHIA)	4–12 weeks	3 days for 1 week with 4 weeks		One of the most important measures of physical rehabilitation was to provide wheelchairs and walkers in order to help patients walk. Amongst the most important rehabilitation activities, doing physical activity to prevent muscle deterioration, back massaging, changing positions to prevent bedsores and training for strengthening bladder were mentioned. For mental rehabilitation, mental support for injured people and their families, and providing psychological consultation meetings for them can prevent stress and anxiety disorders after the event. Results in this paper are related to functions and structures of spinal cord injury, which showed problems including complete impairments in defecation functions, bladder functions and muscle power functions.
Tan et al ^[25] (2006)	Case study	Children	No detail	Tsunami	India	Social, economical, psychological	Orphanages, affected	Long term	No detail		The social, psychological rehabilitation and protection of children are main concerns of social organizations. Rehabilitation activities of UNICEF provides rice, milk and other basic rations including clean water and sanitation to the afflicted region through various programs with participation of countries. Other programs are: children vaccinated from fast-spreading diseases like measles, tetanus and gangrene. Another form of support for the orphans is to provide them with homes. The government and aid groups try to reunite the orphans with their next of kin, making sure that the people who claim the children are authentic relatives and not child traffickers. The creation of "Child-Friendly Spaces" (CFS) in camps and communities provides a platform from which children learn age-relevant competencies that help them cope with the risks and effects. In such an area where children meet other children, a sense of safety, structure and continuity enables them to find psychosocial and physical support, and encourage healthy development.
Math et al ^[26] (2008)	Cross-sectional	Children	535	Tsunami	India	Psychological	Camped, schooled	0–72	Each session lasted 90 to 120 minutes, and 10 to 20 participants were included in each		Psychological rehabilitation intervention for children used three methods: (1) mental health clinic; (2) art therapy; and (3) group discussions. Among art therapy, volunteers and teachers get the children from the relief camps and let them participate in drawing. Initially, participants were not given any theme for the drawings, but later they were asked to draw a picture of their place like village, school, home, playground, temple and environment. They were also asked to describe what they had drawn. This process helped the therapists screen out those who were severely affected by the disaster and these children were referred to psychiatrists in the mental health clinic. Among group discussions, students were asked to describe their experiences regarding the disaster and then the session focused on problems, concerns, and questions faced. Social welfare departments and Nicobar educated them on the need for mental health care for disaster survivors; the (NIMHANS) team contacted the relief camp organizers, school principals, teachers, leaders, and volunteers from the survivor groups to seek their cooperation and help. Intervention rehabilitation included identification of mental disorder symptoms, methods to normalize the daily activities of the children. Meeting counseling was considered until children express their feelings.
Becker et al ^[27] (2009)	Prospective cohort study	Women	200	Tsunami	India	Psychological	Affected setting	4–12 weeks	3 times per week for 2 hours per session for 3 months		Psychological rehabilitation intervention reported by this article for women's included: 10 trained community-level workers provided group sessions consisting of 10 participants, based on a train-a-trainer model; a 3-day experimental training program in psychological care (understanding and diagnosis, therapy techniques, stages of reactions and spectrum of care, needs assessments and referral, special needs of vulnerable groups of women, children, and disabled survivors) provided by the National Institute of Mental Health and Neurosciences professional team (psychiatrists, psychiatric social workers, nurses). Result showed 71% intervention group and 69% control group experienced 2 or more kinds of loss. Survey on intervention group showed 32% had symptoms of severe mental distress, and 22% moderate symptoms. In the control group it was reported 34% and 24% respectively. Significant decrease in total IES scores and subscale IES scores of avoidance, intrusion, and hyper vigilance, which indicated an improvement in symptoms for the psychosocial intervention group.

Authors	Study type	Vulnerable group	Sample size	Disaster type	Man-made	Location	Type rehabilitation	Setting	Post disaster (phase)	Duration	Main concept
Mallick et al ^[28] (2010)	Cross-sectional	The disabled	713	Natural Earthquake		Pakistan	Physical, psychological	Federal Ministry of Health, Institute of Medical Sciences, WHO Fund (UNICEF)	4-12 weeks	3 weeks	With the cooperation of International Handicapped NGO, a team consisting of 57 men and women passed the training courses on basic techniques and how to provide physical rehabilitation services to the spinal cord disabled and those who had undergone vertebral fixture operation to prevent creation of secondary complications. There was a specialized program dedicated to each of the injured individuals which was designed according to the type of injury and the degree of impaired person. Multi-strings approaches for physical rehabilitation were chosen. For enhancing the skills of semi-professional health service providing staff, instructions about increasing personal independence followed by spinal cord injuries has been translated and handed to employees. In addition, instructions for strengthening both patients and their families to adapt to physical limitations and increase personal independence by promoting the existed potentials were developed and handed to families and patients. Some principles about how to make wheelchairs and their adaptability with reconstruction programs were edited. Many patients got injured while they were trying to rescue their family members and most of them witnessed the death of their loved ones. International organizations have performed psychological rehabilitations to prevent negative mental responses in these individuals.
Régnier et al ^[29] (2008)	Case studies	Children, women, the elder	No detail	Tsunami		Indonesia	Economical	NGO	Long term	No detail	Rehabilitation economical actives after the tsunami in Indonesia is allocate 113 million euros for rehabilitation activities in Aceh by World Bank and private and governmental organizations of Nadu, Tamil, under the supervision of UNDP. A lot of economic rehabilitations intervention was conducted for buildings and shelters, and many infrastructure projects were completed by private organizations in Aceh. UNDP offered financial helps to reopen the cost line to help local people create small jobs, like fishing, and pay their life costs. After disaster, women had two types of indirect damage: job loss and damage to efficiency and family income
Rathore et al ^[30] (2008)	Case studies	The disabled	Estimated between 650 and 750	Earthquake		Pakistan	Physical, physiological	Spinal unit at NIHD, Institute of Medical Sciences satellite hospital Mental Health Central Military Hospital Rawalpindi	0-72	No detail	Rehabilitation teams included: physical therapists, occupational therapists, orthopedics, and psychologists, allied health staffs, and other health care professionals around the world brought to Pakistan. Interventions rehabilitation by psychiatrists and psychologists, were aided by a large number of volunteers and social support groups. They were successful in alleviating the survivors' fears and detected their psychological needs. Patients were comforted and counseled to cope by using their religious teachings for inspiration. A religious organization named Al Huda, promoted Islamic knowledge among women of Pakistan. SCI rehabilitation teams provided useful education materials for patients. The physical rehabilitation interventions were provided by rehabilitation teams including: estimating and survey those who had spinal cord injury or amputation from an earthquake, and designing adaptive strategy with disabilities for these people; codification of appropriate policies for dealing with the disabilities caused by an earthquake; using comprehensive partnership to establish provider services organizations and rehabilitation programs; holding training courses for physical rehabilitation actives.
Punani ^[31] (2008)	Conference	The disabled	No detail	Earthquake		India	Physical	No detail	No detail	No detail	The most important physical rehabilitation measures for impaired people after disasters are: 1) determining proper dimensions and sizes for prostheses and providing enough physical rehabilitation services; all impaired persons need not only a fit prosthesis with the same size of the lost part, but also necessary trainings about how to properly use them; 2) physiotherapy: establishing physiotherapy centers in suitable positions at the disaster area through the help of NGOs, and private organizations is considered as one of the most influential parts of physical rehabilitation procedures; 3) establishing work therapy and rehabilitation centers: people get injured and disabled after earthquake. Sometimes, these people need help living their lives and paying costs. These centers can provide some facilities to recognize the remaining abilities of impaired persons and help them start or find a job.

Authors	Study type	Vulnerable group	Sample size	Disaster type	Man-made	Location	Type rehabilitation	Setting	Post disaster (phase)	Duration	Main concept
Edgar et al ^[52] (2006)	Case report	Women	7	No detail	Bombs exploded	Indonesia	Physical	Royal Perth Hospital	0-72	1 month, 6 months, 12 months	Rehabilitation activities after bomb explosion included: the injured people were transferred to hospitals in 3 groups via airplane. Surgical team conducted the necessary surgical measures for hospitalized patients within the first week: curing burns, splinting injured joints, temporal resting of affected limb and performing range of motion activities for muscles in order to prevent muscle deterioration. The injured individuals from bomb explosion were compared with normal uninjured people at the hospital within 1, 6 and 12 months after hospital discharge regarding 3 following factors such as shoulder active range of motion, grip strength, and the Burns Specific Health Scale.
Chiou-Tan et al ^[53] (2007)	Retrospective chart analysis	Women	133	Hurricane		United States	Physical	Astrodome Clinic	3-28 days	1 week after hurricane Katri	After Hurricane Catharina, Astrodome medical clinic was established at the location of the incident within the first 12 hours. Through a period of 19 days, 11 245 patients were examined at this clinic. Except for the first day, through which the clinic just conducted emergency medical services, physical rehabilitation activities provided helping tools such as wheelchairs and walkers, wound treatment materials, Baclofen pumps and pain killers and wheelchair user guide. Rehabilitations interventions included 14 subcategories as follows: foot and leg swelling, leg pain and cramps, headache, neck pain and back pain, skin wounds, fractures, humorous bone disease, neuropathy, leg musculoskeletal problems, musculoskeletal disorders, the brain stroke, burstitis and spinal cord injuries, musculoskeletal disorders and amputations, the most frequent of which were foot and leg swelling, leg pain and cramps, headache, neck pain and back pain. This study found that success of rehabilitation activities was the result of mutual cooperation between medical team of the clinic, supports for leading medical teams, volunteer doctors from Texas, and helps from private sector.
Ni et al ^[54] (2013)	Retrospective cohort study	Women	154	Earthquake		China	Social, physical	Hospital rehabilitation facilities	No detail	No detail	Comprehensive social and physical rehabilitation program included: therapeutic interventions, training and education, vocational and social rehabilitation. Result of this paper showed statistically significant differences in favor of the rehabilitation group in physical dysfunction (rehabilitation group 32.24%, control 67.76%). PTSD unadjusted data showed statistically significant differences in favor of the rehabilitation group and the controls. Being a woman, having average or above-average family income, having witnessed death, and fearfulness were risk factors for PTSD symptoms, 50 months after the earthquake.
Randomized controlled trials studies analyses											
Berger et al ^[55] (2009)	Quasi-randomized controlled trial	Children	166	Tsunami		Sri Lanka	Physical, physiological	Temporary housing camps	Long term	First 3 months after the disaster	Physical and physiological rehabilitation activities in intervention group, included: teaching behavioral and cognitive skills, providing training materials, thinking practices, bio-energetic practices and techniques. The result of this paper showed that compared with the control group, PTSD severity, somatic complaints, functional problems and depression decreased in intervention groups after performing rehabilitation activities.
Zhang et al ^[56] (2013)	Quasi-experimental	Women	331	Earthquake		China	Physical, social	Non-governmental organizations, local health departments, and professional rehabilitation volunteers	Long term	4-10 months for group (NHV-E) intervention, 16 months for group (VHV-L), 16 months for group control	Physical rehabilitation program included: training in self-care and mobility activities; muscle strengthening and ROM, skin care management and education in bladder and bowel, traditional Chinese therapies. Social rehabilitation was included and empowerment was addressed via employment services and personal assistants. Result showed physical rehabilitation and physical functioning was increased in the NHV-L and NHV-E groups, but not in the control group after adjustment for sex, age, type of injury, and time to measurement. NHV-E improved BI scores by about 11.3 points at follow-up; NHV-L improved by 10.7 points. Significant effects were found in both the rehabilitation program and spontaneous recovery. The effect of NHV-E was marginally greater than that of NHV-L.
Zang et al ^[57] (2013)	Randomized control trial	The elder	22	Earthquake		China	Physical, psychological	Hospital and community rehabilitation facilities	3-28 days	4 therapy sessions (60-90 minutes) for 2 weeks with 2-4 daily between each session	Compared with wait list control group at post treatment, rehabilitation NET group had significant reductions in PTSD symptoms, IES-R avoidance, intrusion, and hyper arousal subscales anxiety and depression, HADS subscales, general mental stress, GHQ-28, and increased posttraumatic growth. NET in which the patient assisted by the therapist, constructed a detailed chronologic report of his/her own biography with a special focus on the traumatic experiences; the narrative was recorded by the counselor and corrected with each subsequent reading. The participants were encouraged to relive emotions while reporting the events. Rehabilitation program improved long-term functioning of Sichuan earthquake survivors with disabling injuries.

of services and activities from the day after the onset of the disaster based on the equal time and opportunity to governmental authorities and aid agencies. The strategies that can increase the participation of the vulnerable groups in meeting their needs include: (1) providing services with the cooperation of the people based on the capacity and potency; and (2) dependency of the vulnerable groups to the external services that should be gradually decreased. Reciprocally the use of social sources of the damaged area may be increased.^[14,15,18,21,25,28,34]

Studies also emphasized the activity of vulnerable groups especially women in the economic rehabilitation activities in order to meet financial needs by starting small businesses. Supporting the social activity of women leads to ability to direct and organize many active and potent individuals. The most important obstacle for the cooperation of the women in economic rehabilitation activities is the focus of international and local organizations on men as the head of the family and the provider of the financial needs of the family.^[15,17,29] Studies also showed that one of the most important approaches in implementation of the rehabilitation processes is the use of local media especially television and radio to provide vital information about rehabilitation procedures such as training courses for the vulnerable groups. Audiovisual tools play an important role in gathering social sources to provide rehabilitation services.^[19]

The main barriers for implementing rehabilitations programs reported in some of the studies were lack of detailed information of affected population, lack of trained personnel, structural and non-structural destruction caused by emergencies and disasters, shortage of trained rehabilitation professionals and medical workforce, lack of coordination with other responsible agencies and private volunteer organizations, reduced sensitivity of authorities after a few days from disaster, and lack of comprehensive management plans for disabilities persons after occurrence emergencies and disasters.^[13,14,21,28] We did not find any programs related to spiritual rehabilitation for vulnerable groups after emergencies and disasters. Some of reviewed articles did not specify details regarding the duration of rehabilitation period, which was recognized as one of the studies weaknesses.

CONCLUSION

The review of the papers showed different programs of physical, physiological, economic and social rehabilitations for vulnerable groups after emergencies and disasters. These programs may help health field managers better implement

correct and timely rehabilitation activities. This review emphasizes comprehensive participation of people affected in all stages of rehabilitation programs and also attention to cultural, social, economic and religious considerations during implementation of rehabilitation activities after emergencies and disasters. The majority of the papers emphasized that the rehabilitation process has different dimensions, in addition, implementation of each of them needs facilities, resources and special approaches that correlate to other domains. Occasionally there are overlaps between the activities related to all domains, so successful rehabilitation process from disasters requires a systemic and holistic viewpoint simultaneously with implementation of specific programs related to each domain.

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