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Experience of people with physical disability: Mobility needs during earthquakes

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Abstract:

BACKGROUND: People with physical disability are vulnerable in disasters because of their mobility limitations. They are unable to escape from hazards and their needs have been somewhat neglected in planning and relief measures.

AIM: This study aimed to identify the mobility needs of people with physical disability during earthquakes across different provinces of Iran.

MATERIALS AND METHODS: A qualitative study was conducted using 18 semi-structured interviews with participants who had a kind of mobility disability. The participants, across six provinces of Iran who had experienced an earthquake, were selected by purposive sampling in two ways of snowballing and maximum variation in 2017. Data were analyzed thematically assisted by MAXQDA 10 software.

RESULTS: The mobility needs included house and workplace adaptation, spare assistive devices, easy access to vehicles, special facilities for emergency evacuation, adaptation and accessibility of shelters, adapted bathroom and toilet, and transferring by others.

CONCLUSION: By considering needs and experiences of people with physical disability in disaster planning, appropriate interventions can be arranged to promote the level of response in disasters. Such measures can have a significant role in maintaining the lives and health of such people.

Keywords:

Disasters, earthquakes, mobility limitation, needs, people with disabilities

Introduction

For centuries, natural disasters and their management have been a major concern for human. Natural disasters are reason of 86% of all disaster-induced deaths in the world, while 75% of such deaths occurred in Asia.^[1] Iran is an earthquake-prone Asian country and one of the most vulnerable ones so that about 180,000 Iranians have perished because of earthquake since the last century.^[2,3] In such a vulnerable situation, people are prone to get affected by natural disasters, especially in terms of health and quality of life, that can lead

to specific conditions and formation of new needs.^[4-6] Nevertheless, people with disabilities which account almost for 15% of world's population,^[7] due to their limitations, may experience more severe complications.^[8-10]

The Sphere project that suggests minimum standards for humanitarian response emphasizes that people with disabilities are much more vulnerable than others in disasters.^[11] There are some issues that often make these people more vulnerable in critical situations, including lack of right understanding of disasters, limited or no access to response services (such as evacuation and rescue services), absence of safe and proper shelters, and limited access

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to water and sanitation because of inappropriate design of facilities or lack of rehabilitation aids. Moreover, long-term consequences of emotional conflicts and trauma, misinterpretation of location, and communication problems exacerbate their situation.^[12]

During Andaman Islands' tsunami in 2004, all 700 physically disabled people died, simply because they were unable to run and access higher lands. Similar reports from Indonesia and Thailand show the high rates of death among people with mobility disability.^[13] Furthermore, studies show that such people are less prepared to encounter with disaster than others and are more vulnerable to displacement, injury, and death.^[14,15] In addition, limitations such as costs, staffs, knowledge, security, and other problems inhibit guideline modification for meeting the needs of people with physical disability in disastrous situation.^[16]

Evidence also suggest that there is no specific program for managing people with disabilities in disasters in Iran and they usually do not receive specific support in meanwhile.^[17] Most relief measures are not disability inclusive,^[18,19] or the existing measures are not appropriate for Iranian context. Considering the above-mentioned concerns, it seems that these people and their needs are often neglected. Hence, since people with disabilities, like others, deserve to receive suitable services,^[20] and due to scarceness of conducted studies on their needs (especially their mobility needs) in the international^[21-23] and in Iranian context,^[15] the current study aimed at identifying the mobility needs for people with disabilities during earthquakes.

Materials and Methods

This study was conducted qualitatively since qualitative studies can explore special needs and their roots in the human.^[24,25] The paradigm was advocacy and participatory through which the voice of participants is heard throughout the research process.^[26]

Participants

The inclusion criteria for study participants were literate, having mobility disability along with an experience of earthquake in six provinces of Iran including Gilan (Rudbar-Manjil, June 20, 1990), Qazwin (Changureh [Avaj], June 22, 2002), Kerman (Bam, December 26, 2003), Mazandaran (Firouzabad-Kojour [Baladeh], May 28, 2004), East Azerbaijan (Ahar-Varzeghan, August 11, 2012) and Bushehr (Shonbeh Earthquake of April 09, 2013). Participants were selected and invited for interviews through the Welfare Organization in Tehran (capital of Iran) and the above-mentioned provinces and nongovernmental organizations who had

a focus on rehabilitation. Hence, a purposeful sampling, considering the maximum variations in demographic characteristics, including the magnitude of earthquake faced, occupation, education, marital status, gender, and type and severity of disability, was conducted. Then, to reach a saturation of experiences and types of needs, snowballing was conducted in order to access appropriate participants.^[27] After 18 interviews (11 men and 7 women), data saturation was performed.

Data collection

Data were collected using semi-structured interviews.^[28] The topic guide was developed by considering the objectives of the study, literature review, and research team members' consensus. Besides, questions were modified after conducting the first three interviews.

The interview questions were about participants' individual experience of dealing with the earthquake, the needs and required facilities, and quality of postearthquake rescue and first aid services. Interviews were carried out from January 2017 to July 2017, some in telephone, ranged from 44 to 62 min.

Data analysis

Any interview was transcribed verbatim and analyzed thereafter, before conducting a new interview. Also in order to enhance reliability, through triangulation considerations, national documents around people with disabilities and regulations for supporting them were reviewed through analysis.^[25]

Content analysis method was used for data analysis.^[24] For the unity and robustness of analysis, coding was performed initially by a member of the research team (SP) and cross-checked by other members. After reaching a consensus on coding frame, the leading author did the rest of coding. MAXQDA software version 10, (developer VERBI GmbH, Marburg, Germany) was used for code management.

Ethical considerations

Before initiating the study, the approval of Iran University of Medical Sciences' ethics committee, code IR.IUMS.REC 1394.9221567202, was granted. At the onset of each interview, a summary of the study objectives was presented to the participants, and some clarifications were provided regarding the voluntary nature of participation, confidentiality, and right to withdrawal from the study at any time.

Results

The demographic characteristics of participants are shown in Table 1. Eighteen participants with an average age of 37.5 years were interviewed. Based on the findings,

Table 1: Demographic characteristics of participants

Code	Gender	Age	Marital status	Level of education*	Work status	Assistive devices	Disability	Cause of disability	Experienced earthquake in Iran
P1	Male	36	Married	HSD	Yes	Wheelchair	Paraplegia	Poliomyelitis	Firoozabad-Kojour (2004)
P2	Female	40	Single	BS	Yes	Wheelchair	Paraplegia	Multiple sclerosis	Firoozabad-Kojour (2004)
P3	Male	44	Single	HSD	Part time	Wheelchair	Spinal cord injury	Accident	Bam (2003)
P4	Male	33	Single	HSD	Yes	Wheelchair	Spinal cord injury	Congenital	Bam (2003)
P5	Female	35	Single	Student of MS	Yes	Orthopedic shoes	Mild left lower limb paralysis	Poliomyelitis	Rudbar-Manjil (1990) Avaj (2002)
P6	Male	32	Single	HSD	Yes	Wheelchair	Paraplegia	Poliomyelitis	Bam (2003)
P7	Male	40	Single	HSD	No	Wheelchair	Paraplegia	Muscular dystrophy	Ahar-Varzeqan (2012)
P8	Female	29	Single	BS	Yes	No	Genu varum	CDH	Ahar-Varzeqan (2012)
P9	Male	41	Married	BS	Yes	Elbow crutch	Paraplegia	Congenital	Ahar-Varzeqan (2012)
P10	Male	26	Married	HSD	No	Wheelchair	Quadriplegia	Seizure	Ahar-Varzeqan (2012)
P11	Female	35	Single	Ph.D. Student	Part time	No	Knee arthroplasty	Knee tumor	Ahar-Varzeqan (2012)
P12	Female	23	Single	BS Student	No	Orthopedic shoes	Mild right lower limb paralysis	Penicillin injection	Ahar-Varzeqan (2012)
P13	Female	43	Married	MS	Yes	Knee-ankle-foot orthosis	Right lower limb paralysis	Congenital	Ahar-Varzeqan (2012)
P14	Female	42	Married	AS	Yes	Hip-knee-ankle-foot orthosis and elbow crutch	Paraplegia	Poliomyelitis	Ahar-Varzeqan (2012)
P15	Male	43	Married	BS	Yes	No	Paraparesis	Poliomyelitis	Shonbeh (2013)
P16	Male	44	Married	Primary education	No	No	Paraplegia	Seizure	Shonbeh (2013)
P17	Male	55	Married	Primary education	No	Wheelchair	Quadriplegia	Accident	Shonbeh (2013)
P18	Male	32	Married	BS	No	No	Paraplegia	Congenital	Shonbeh (2013)

*HSD=High school diploma, AS=Associate of science, BS=Bachelor of science, PhD=Doctor of philosophy

movement needs are conditions in which individuals are faced with mobility problems that affect their performance through earthquake and such conditions threaten their lives and health. Seven mobility needs were recognized including house and workplace adaptation, spare assistive devices, easy access to vehicles, special facilities for emergency evacuation, adaptation and accessibility of shelters, adapted bathroom and toilet, and transferring by others.

House and workplace adaptation

People with disabilities, due to their movement problems and using assistive devices, need adapted house and workplace to enable to escape from dangerous conditions through earthquakes. They pointed to obstacles, such as stairs and environmental constraints. *"During earthquake, I could not get out myself because our house had some stairs and my family helped me. Most homes in rural areas have at least one or two steps, and a person with movement limitation cannot leave the house easily and needs to help. The majority of the deaths occurred in these places."* (P7)

Having spare assistive devices at home or workplace

Since assistive devices have an important role in the mobility of people with disabilities, a large number

of participants mentioned them as the first need after earthquake. Besides, lack of assistive devices or damage to them can cause major problems in the mobility and independence of people with disabilities and create a sense of being a burden in them.

"I am a person who says disability is not a limitation. But exactly on the moment of the earthquake I noticed I cannot run. Everybody went out easily, I had no lower limb orthoses, and as a result, I crawled into the alley. Before the earthquake, I disregarded the people who might see me in this condition, but at that moment, wished I was not disabled, because understood that disability really had imposed severe limitations I was not aware of. Therefore, there should be several assistive devices at home, located at their backyard or so, for people with disabilities" (P14).

Access to vehicles

Need for evacuation of the unsafe area along with environmental obstructions and destructed roads in most cases necessitates having a suitable vehicle based on the physical conditions of people with disabilities. This can save their lives and facilitate their transportation from the disaster area. *"Fortunately, when we saved ourselves the car was in the yard. We got out of the area by the car; without*

the car it was impossible to get out, since wheelchair would not be suitable to pass the streets full of construction debris” (P3).

Considering special facilities for emergency evacuation

Participants stated the need for special facilities for emergency evacuation due to their mobility problems and inability to use stairs to exit buildings. Considering some measures such as special elevators, appropriate emergency exit routes, ramps, and trained people to rescue and relocate people with disabilities can help to safe evacuation that they pointed out. In addition, swarms of the healthy people who flee the area necessitate consideration of special facilities for the evacuation of physically disabled people. *“Although using elevator is prohibited during the earthquake, but there is not even a ramp here. If there are special elevators for disabled persons that can be used in earthquake conditions, it can be helpful with regard to crowd of healthy people” (P2).*

“If an appropriate emergency exit route be in place or rescue teams be present at the site to prioritize relocation of disabled and elderly people, the conditions would be favorable. As soon as I felt the earthquake, I lifted myself on the steps somehow, but if a disabled person has damaged spinal cord he/she cannot get separated from the wheelchair, therefore, other alternatives must be considered” (P1).

Adaptation and accessibility of shelters

One of the important concerns after any earthquake is shelters. Participants pointed out some accommodation problems after the earthquake, such as lack of tents. *“They gave a tent to each family after four days. So in the first days, when the sun came out, they picked me up and put me in the shade to sit there, while at night they brought me back again, all because we did not have a tent at first” (P13).*

Besides, the participants mentioned that the interior features of shelters should make easy access and appropriate for them. *“Since, I was not used to sitting on the floor, blisters developed all over my body. The temperature was also very high, and conditions were very difficult. The most important point in accommodation of disabled people is establishing the appropriate situations” (P18).*

Considering adapted bathroom and toilet

Due to the physical problems, people with disabilities need to use special facilities such as particular bathroom and toilet. Lack of these facilities in shelters, face disabled people with serious problems after the earthquake. *“I could not go to toilet or wash my face for four days, because it was hard for me. The school (accommodation place) should have at least a sitting toilet. All were squat toilet” (P11).*

Transferring by others

After earthquakes, passages to transport people with disabilities are often unusable, since these people usually

have mobility problems and use assistive devices. *“Street beams and trees were fallen on the ground. We wanted to get to our village but the road was filled with stones, fallen down from the mountains. In these conditions, transportation was impossible for me” (P8).*

Participants also believed that help of other people is necessary for their transferring, especially in the 1st h after the earthquake when clearing of debris is not yet started. *“I hardly went out, since debris fell in the street. The neighbors brought me with the wheelchair up to the alley” (P4).*

Discussion

People with disabilities who had the experience of dealing with earthquake mentioned that house and workplace adaptation, access to vehicles, having spare assistive devices, considering special facilities for emergency evacuation, adaptation and accessibility of shelters, considering adapted bathroom and toilet, and transferring by others as their main mobility needs.

Need for assistive devices is one of the important needs, acknowledged by most participants, due to the mobility problems and specific conditions after the earthquake. They believed that lack of assistive devices after earthquake is equal to being a burden. Participants also mentioned the need for having spare assistive devices at home or workplace as vital. Hunt *et al.* also confirmed this issue in their study and explored that people with disabilities encounter losing their assistive devices, damage to their natural or built environment, separation from caregivers, and being left out during evacuation.^[29] Morris and Jones also found one of the central elements of emergency program as considering assistive devices for people with disabilities.^[30]

Today, it is believed that developing and enhancing barrier-free environments for every member of the society with all levels of ability is an inevitable necessity, and it is not limited to any particular class or group of society.^[31] Hunt *et al.* believed that one of the major challenges of people with disabilities after earthquake is finding proper shelter or housing.^[29] The findings of this study also approve the need for accommodation in an adapted and accessible setting. Due to the mobility problems of these people, architectural barriers and inadequate space and facilities for transportation cause disabled people to lose their independence and become unable to fulfill their needs, such as using the toilet, bathroom, going out to receive services, and do other activities. Existing facilities such as ramps, elevators, entrances, and corridors with standard width, special bathroom and toilet for people with disabilities at the proper height can eliminate accessibility problems. Studies on shelters reveal that certain facilities and

physical access often are not fulfilled in response to physically challenged people.^[32] Hemingway and Priestley, in their study, acknowledged the negative impacts of disasters on people with disabilities, such as access to shelter.^[33]

Participants in this study needed that their workplace and homes become suitable for timely evacuation during earthquakes. Besides, with respect to barriers such as stairs, most people were reluctant to evacuate the unsafe place because of their mobility problems and their inability to pass through the stairs. Similarly, the reluctance of these people to evacuate the building because of architectural barriers and attitudes of others toward them have been emphasized by Phibbs *et al.*^[21] In addition, other studies suggest that people with disabilities are somewhat disregarded on building evacuation. What make the situation worse is that these people usually impede or slow down the evacuation process for others. Although using stairs in vertical evacuation in low-lying buildings might be possible for disabled people, movement limitations, possibility of getting harmed, and need for considerable help are some of the impediments in this regard.^[34] On the other hand, buildings are usually designed in a way that people need to descend the stairs, get out of the windows, and open the emergency exit doors that often create obstacles for people with mobility disability.^[22] Therefore, due to the restrictions in using stairs as the only emergency exit solution, a number of studies have proposed using elevators in tall buildings.^[35-38] Researchers consider loss of infrastructure including electric power during the disaster as one of such solutions^[39] that often lead to unusability of the elevator and other transportation-related facilities. Besides, it is dangerous to use elevators in old buildings due to the possibility of damage to the electric controls, electric power, and fire and smoke protection systems. These problems have been modified in new buildings, and even in some of old ones (such as Stratosphere tower in Las Vegas and the Eureka Tower in Melbourne) so that there are special elevators for emergency evacuation of people with disabilities.^[34] If people using wheelchairs are permitted to use elevators for evacuation, the evacuation process will be accelerated and passages will not get blocked by people. Thus, evacuation authorities must make sure that the elevators are suitable for discharge and do not have the above-mentioned risks. Further, other measures should be considered to facilitate relocation of these people.

Another matter that participants declared was need for help in transportation to safe areas and receiving necessary services. It seems that, due to mobility limitations, closure of roads or their destruction after the earthquake, the presence of debris in the streets,

and time-consuming process of cleaning the passages up, and transportation barriers among disabled people can lead to isolation and exclusion of them. Morris and Jones also believe that people with disabilities often get trapped and stay alone for days following natural disasters because of the obstruction of streets and public passages.^[30] As a result, this issue should be considered as a priority program.

Metz *et al.* mentioned that 59% of families with disabled people who lived near the storage of chemical weapons in Alabama reported lack of proper vehicles for discharging.^[40] Public transportation system is one of the infrastructures that gets destroyed after the earthquake. In this situation, people with disabilities should pay high costs of taxi for transportation.^[21,33,40] Participants in this study declared the need for having personal vehicles during earthquake, due to their movement problems as well as lack of access to public transport and problems associated with unaccommodated transportation. Considering appropriate vehicle for them before the earthquake can solve this significant issue.

This qualitative study is one of the first studies conducted to identify the mobility needs of people with physical disability in earthquakes in the country. The main limitation of the study was inadequate information about those participants who have experienced earthquakes which possibly might lead to missing some good cases. The researchers tried to overcome this limitation by seeking to find appropriate participants through various sources.

Conclusion

Beyond their mobility needs, people with disabilities experience various problems, such as lack of independence, being a burden, and feeling of deprivation and restriction. The causes of such problems might be negligence of certain needs and poor quality of provided services at the time of earthquake. In addition, these issues can lead to inequality in access and so ignorance of human rights among people with physical disability.

An important finding in our study regarding movement needs of people with disabilities was need for independence and human dignity like normal people. Most of the participants pointed to surprised or contemptuous glances of others due to the obstacles that impeded physically disabled people's way while evacuating as their main concern after the earthquake. Such obstacles that they had no part in creating them were due to the lack of identification of certain needs and negligence for meeting them by planners and policymakers.

Therefore, there are some suggestions for managers and policymakers in order to fix these problems and improve disaster response phase including identifying needs from the perspectives of people with disabilities in disasters; adapting shelters for people with disabilities, especially bathrooms and toilets; considering necessary facilities for emergency evacuation, including removal of architectural barriers and considering special elevators prioritized for transporting people with disabilities; educating and deploying rescue teams equipped with assistive devices; and conducting further studies on this issue.

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Conflicts of interest

There are no conflicts of interest.

References

- Forouzan AS, Baradarn Eftekhari M, Falahat K, Dejman M, Heidari N, Habibi E, et al. Psychosocial needs assessment among earthquake survivors in Lorestan province with an emphasis on the vulnerable groups. *Glob J Health Sci* 2013;5:79-84.
- Djalali A, Khankeh H, Öhlén G, Castrén M, Kurland L. Facilitators and obstacles in pre-hospital medical response to earthquakes: A qualitative study. *Scand J Trauma Resusc Emerg Med* 2011;19:30.
- National Report of the Islamic Republic of Iran on Disaster Reduction. World Conference on Disaster Reduction. 18th-22nd. Kobe, Hyogo, Japan; 2005.
- Boroschek R, Retamales R. Guidelines for Vulnerability Reduction in the Design of New Health Facilities. Washington, DC: PAHO/World Bank; 2004.
- Sudaryo MK, Besral, Endarti AT, Rivany R, Phalkey R, Marx M, et al. Injury, disability and quality of life after the 2009 earthquake in Padang, Indonesia: A prospective cohort study of adult survivors. *Glob Health Action* 2012;5:1-1.
- Emami MJ, Tavakoli AR, Alemzadeh H, Abdinejad F, Shahcheraghi G, Erfani MA, et al. Strategies in evaluation and management of bam earthquake victims. *Prehosp Disaster Med* 2005;20:327-30.
- World Health Organization. World Report on Disability. Geneva, Switzerland: World Health Organization; 2011.
- World Health Organization. Disaster Risk Management for Health: People with Disabilities and Older People United Kingdom: World Health Organization; 2011.
- Abbott D, Porter S. Environmental hazard and disabled people: From vulnerable to expert to interconnected. *Disabil Soc* 2013;28:839-52.
- Mace SE, Doyle CJ. Patients with access and functional needs in a disaster. *South Med J* 2017;110:509-15.
- Greaney P, Pfiffner S, Wilson DD. Humanitarian Charter and Minimum Standards in Humanitarian Response. Southampton, United Kingdom: The Sphere Project; 2011.
- Kabir AH, Islam R, Islam MM, Maloyan S. How to Include Disability Issues In Disaster Management: Following Floods 2004 in Bangladesh. Bangladesh: Handicap International; 2005.
- Hans A. Disaster Management and Disability: Promoting a Research Agenda. Bhubaneswar: Shanta Memorial Rehabilitation Centre; 2012. Available from: http://www.preventionweb.net/files/9706_DisasterManagement.pdf. [Last accessed on 2017 Jan 15].
- Dunn J. New Zealand wheelchair users' preparedness for emergencies. *Aust J Disaster Trauma Stud* 2017;21:3-18.
- Aryankhesal A, Pakjouei S, Kamali M. Safety needs of people with disabilities during earthquakes. *Disaster Med Public Health Prep* 2017; Forthcoming:1-7. DOI: 10.1017/dmp.2017.121
- Fox MH, White GW, Rooney C, Rowland JL. Disaster preparedness and response for persons with mobility impairments results from the University of Kansas nobody left behind study. *J Disabil Policy Stud* 2007;17:196-205.
- Abbasi Dolatabadi Z, Seyedin H, Aryankhesal A. Policies on protecting vulnerable people during disasters in Iran: A Document analysis. *Trauma Mon* 2016;21:e31341.
- Sagun-Ongtangco KS, Abenir MA, Bermejo CT, Shih ED, Wales JV, Plaza J. Perspectives of the UST NSTP facilitators on disability and disaster risk reduction and management: A qualitative case study. *Int J Disaster Risk Reduct* 2016;16:134-41.
- Zod R, Fick-Osborne R, Peters EB. A functional needs approach to emergency planning. *Disaster Med Public Health Prep* 2014;8:301-9.
- Pakjouei S, Vameghi R, Dejman M, Vameghi M, Kamali M. Satisfaction and related factors among the service users of private rehabilitation centers. *Iran Rehabil J* 2014;12:35-42.
- Phibbs S, Good G, Severinsen C, Woodbury E, Williamson K, editors. Emergency Preparedness and Perceptions of Vulnerability among Disabled People Following the Christchurch Earthquakes: Applying Lessons Learnt to the Hyogo Framework for Action. AJDTS, IRDR Conference; 2015.
- Stough LM, Sharp AN, Resch JA, Decker C, Wilker N. Barriers to the long-term recovery of individuals with disabilities following a disaster. *Disasters* 2016;40:387-410.
- Phibbs S, Good G, Severinsen C, Woodbury E, Williamson K. What about Us? Reported experiences of disabled people related to the Christchurch earthquakes. *Procedia Econ Finance* 2014;18:190-7.
- Pope C, Mays N. Qualitative Research in Health Care. 3rd ed. Oxford: Blackwell; 2006.
- Streubert HJ, Carpenter DR. Qualitative Research in Nursing: Advancing the Humanistic Imperative. Philadelphia: Lippincott Williams & Wilkins; 2011.
- Creswell JW. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th ed. Los Angeles, CA: Sage Publications California; 2014.
- Zaletel-Kragelj L, Bozikov J. Methods and Tools in Public Health. A Handbook for Teachers, Researchers and Health Professionals. Laga: Hans Jacobs Publishing Company; 2010.
- Creswell JW. Qualitative Inquiry and Research Design Choosing Among Five Approaches. 2nd ed. Thousand Oaks, CA: Sage Publications; 2007.
- Hunt MR, Chung R, Durocher E, Henrys JH. Haitian and international responders' and decision-makers' perspectives regarding disability and the response to the 2010 Haiti earthquake. *Glob Health Action* 2015;8:27969.
- Morris JT, Jones ML. Emergency preparedness for people with disabilities. *Arch Phys Med Rehabil* 2013;94:219-20.
- United Nations General Assembly. Convention on the Rights of Persons with Disabilities: Resolution/Adopted by the General Assembly, 24 January 2007a/res/61/106; 2007.
- Twigg J, Kett M, Bottomley H, Tan LT, Nasreddin H. Disability and public shelter in emergencies. *Environ Hazards* 2011;10:248-61.
- Hemingway L, Priestley M. Natural hazards, human vulnerability and disabling societies: A disaster for disabled people? *Respir Distress* 2014;2:57-68.
- Koo J, Kim YS, Kim BI, Christensen KM. A comparative study

- of evacuation strategies for people with disabilities in high-rise building evacuation. *Expert Syst Appl* 2013;40:408-17.
35. Williamson BJ, Demirbilek N, editors. *Use of Lifts and Refuge Floors for Fire Evacuation in High Rise Apartment Buildings*. Proceedings of the 44th Annual Conference of the Australian and New Zealand Architectural Science Association; 2010.
 36. Luo M, Wong KH, editors. *Evacuation Strategy for Super Highrise Building*. Hong Kong: Proceedings of 5th Annual Seminar on Tall Building Construction and Maintenance; 2006.
 37. Xiong B, Luh PB, Chang SC, editors. *Group Elevator Scheduling with Advanced Traffic Information for Normal Operations and Coordinated Emergency Evacuation*. *Robotics and Automation, 2005 ICRA 2005 Proceedings of the 2005 IEEE International Conference on*; 2005.
 38. Aloï S, Rogers J. *Evacuation and life safety strategies for super high rise buildings*. *Building for the 21st Century: Technology, Livability, Productivity*. London, UK2001. p. 429-36.
 39. Rooney C, White GW. *Consumer perspective narrative analysis of a disaster preparedness and emergency response survey from persons with mobility impairments*. *J Disabil Policy Stud* 2007;17:206-15.
 40. Metz WC, Hewett P, Muzzarelli J, Tanzman E. *Identifying special-needs households that need assistance for emergency planning*. *Int J Mass Emerg Disasters* 2002;20:1-22.