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Study on earthquake risk reduction from the perspectives of the elderly

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ABSTRACT

In many areas, disasters are a paramount risk to the lives and livelihoods of people and to their social-economic development. Earthquakes are among the most dangerous geologic phenomena on our planet. The elderly are particularly exposed to disaster risk and are likely to suffer from higher rates of mortality, morbidity and economic damage to their livelihoods. However, they are seldom given due consideration in disaster response from their perspectives, such as their unique capabilities and experiences, familiar societal roles, living conditions and specific needs. Furthermore, the elderly are often neglected particularly when compared to children. Using a quantitative methodology, this article aims to evaluate whether age has an impact on mortality rate, explores age groups with the greatest vulnerabilities of the *2008 Wenchuan Earthquake, in China* and the *1995 Kobe Earthquake, in Japan*. Data of the final death tolls and total population sorted by age in the two afore-mentioned earthquakes were collected from the HYOGO Pref-medical Association and the Dujiangyan Bureau of Statistics. One-way ANOVA (multiple comparison analysis) was applied to analyze the data. Results of this study showed that in the *2008 Wenchuan Earthquake in China* and the *1995 Kobe earthquake in Japan* there is a greater significance in the relationship between the elderly aged over 75 and the mean mortality rate than that of children. To achieve greater resilience to disasters requires that older people's significant vulnerabilities are identified, and considerations discussed from their own unique perspectives are recognized and promoted to enhance disaster risk reduction.

1. Introduction

Earthquakes are common in Japan and China which causes extensive loss of property and human lives. The second social issue is related to the growing population of older adults. The worldwide population aged 65 years and over is predicted to increase between 2000 and 2030 from 550 million to 973 million (Goulding et al., 2003; Oral et al., 2015). It is estimated that the global number of older people will exceed the number of children for the first time in 2045, and the proportion of older people will rise to 22% by 2050. This means that 1 in 5 people will be 60 years or older by the year 2050 and that there will be 2 billion older people alive in the world, which is triple the number of elderly in 1950s (Chen et al., 2014). Therefore, a greater number of older adults will be affected by disasters as this demographic group increases over time (Tuohy and Stephens, 2011).

Vulnerability is generally defined as the diminished capacity of an individual or group to 'anticipate, cope with, resist and recover from' the impact of a natural or man-made hazard (Blaikie et al., 1994). Simply stated, vulnerability means the potential for loss (Chipo et al., 2015). The United Nations International Strategy for Disaster Reduction defines vulnerability as a set of conditions and processes resulting from physical, social, environmental and economic factors that increase the susceptibility of children towards the impacts of hazards. This means the vulnerability for the potential of loss (Turner et al., 2003; Füssel, 2007).

Studies have shown that variables associated with survival actions such as age yielded controversial findings. Several researchers have found that elderly disaster victims are less susceptible to post-traumatic stress or other psychological disorders than younger victims (Bolin and Klenow, 1988; Huerta and Horton, 1978; Thompson et al., 1993). However, most studies found that children in particular tend to suffer the most from the impact of disasters rather than the elderly. Children are considered more vulnerable to disasters than other social groups due to their "physical size, levels of psychological and behavioral development, and complete or partial dependence on adults for various forms of support and protection" (Zahran et al., 2008; Chipo et al., 2015; Lawler and Patel, 2012). The root causes of this vulnerability lie with the lack of access to the resources that allow people to cope with hazardous events-such as income, education, health and social networks (Bradshaw and Fordham, 2013). In contrast to

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the above research, some research suggests that older adults experience higher mortality and morbidity rates than younger populations. Older adults may have impaired mobility, diminished sensory awareness, multiple chronic health conditions, along with social and economic limitations—all of which can impair their ability to prepare for, respond to, and adapt during emergencies. The World Health Organization (WHO) has identified older adults as a vulnerable population who are more likely to be at greater risk in a disaster. They experience more negative impacts and are more likely to have higher morbidity rates than the rest of the population in a disaster (Bolin and Klenow, 1988; Bourque et al., 2006; Perry and Lindell, 1996; WHO, 2008; Cutter et al., 2003).

Specific vulnerabilities based on age-differentiated groups have been highlighted by recent catastrophic events. Knowledge of specific age groups' vulnerability helps in trying to build theories and models that explain human experiences in disasters because without a sustained focus on elders, their special needs maybe neglected. The issue of recognizing and promoting the unique capacities of the elderly is, unfortunately, poorly understood and has not been explored in depth within current literature.

Much of the existing research on age-based vulnerability of disasters has been conducted in terms of children who are more commonly considered to be taken more care of since they are undergoing rapid development in their mental, social and physical capacities and thus their risk is even greater because of the long-term implications of their vulnerabilities (Bartlett, 2008; Weissbecker et al., 2008). Within the field of older adults' vulnerability, there is a large body of experiential knowledge concerning the elderly, however there are very few studies that include a detailed quantitative analysis of the significant relationship between the elderly and mortality rate in the context of large-scale earthquakes and in which the unique capabilities of them are explored. Therefore, this research aims to answer the following research questions: (1) Are the elderly more vulnerable compared to children among earthquakes? (2) How to perform earthquake risk reduction from the perspectives of the elderly, such as their unique disaster capabilities and experience, familiar societal roles, living conditions and neglected needs more realistically and scientifically?

To address this deficiency, a quantitative research study involving 18 affected age groups by the 2008 Wenchuan Earthquake in China and the 1995 Kobe Earthquake in Japan is employed to explore the older adults' vulnerabilities and their unique capabilities in DRR. The paper begins by exploring some of the literature and debates around older adults and disasters in relation to the effects of disasters on the elderly and a framework for understanding older adults' participation in DRR. We then present two large-scale earthquakes in China and Japan where earthquakes frequently occur to illustrate the disaster context. After outlining our research methodology, multiple comparison analysis was performed to explore the relationship between different generations and the mean mortality rate; and to perform the discussion on disaster risk reduction from the perspectives of the elderly.

2. The elderly and disasters

The elderly are a vulnerable population prone to the detrimental impacts of earthquakes. Although the elderly are often considered as the most affected population group, globally their voices, experiences, perceptions about disasters, and their role in the disaster risk reduction (DRR) process are relatively absent in hazard/risk literature. The reality is that despite older adults' ability to remain independent and cope in everyday situations, a SWE (significant weather event) may push them over their coping threshold (Tuohy and Stephens, 2011), putting them at risk of becoming more vulnerable to the disaster. Research suggests that there is a negative correlation between the age of adult victims and the disaster recovery process (Quarantelli, 1993).

Their high vulnerability has been related to individual characteristics which may increase their susceptibility to the impact of disasters such as: having chronic illnesses that need specific treatment interventions, slower reaction times and psycho-social issues specific to older age including transition, loss and difficulties seeking assistance. Statistics from recent disasters illustrate that: studies of Hurricane Katrina demonstrated disproportionately poorer outcomes for older adults, the Aceh (Indonesia) tsunami in 2004 recorded the highest death rates for those over 60 years of age (Tuohy and Stephens, 2011), and the death rate during the Paris heat wave in 2003 was highest for those over 70 years old (Pirard et al., 2005). The greatest mortality during and immediately after Hurricane Katrina in 2005 was amongst the elderly, who accounted for approximately 75% of the bodies found immediately after the SWE (Adams et al., 2011). Events such as the 2005 hurricane season and the 2011 earthquake and tsunami in Japan have shown that some characteristics of older adults put them at a greater risk of illness and death during many types of emergency disasters (AARP, 2006). Poverty and disadvantage were key contributing factors, with the Baylor College of Medicine (2006) reported that 65% of older adults in New Orleans who lived in their own homes lacked transportation options and/or were without the physical or mental ability to self evacuate. Statistics from recent disasters illustrate this: studies of Hurricane Katrina demonstrated disproportionately poorer outcomes for older adults; the Aceh (Indonesia) tsunami in 2004 recorded the highest death rates for those over 60 years (Tuohy and Stephens, 2011), and the death rate during the Paris heat wave in 2003 was highest for those over 70 years (Pirard et al., 2005). In such cases, the elderly tend to suffer disproportionately due to their unique physiological, psychological and other attributes when disasters occur.

It is important to note that from the outset there is little quantitative empirical evidence for the relationship between age groups in the event of disasters along with very limited literature on enhancing disaster risk reduction from the unique perspectives of the elderly. Within this, there is a lack of quantitative data and methodology available to measure the impact of age on the number of deaths to explore the elderlies' greater vulnerabilities compared to that of children and to further explore the access to achieve greater resilience to disasters by recognizing and promoting their distinctive features.

3. Elderly participation in DRR

When compared to the general population, older people face higher risks and are disproportionately affected in disasters, emergencies, and conflict situations. Recognizing and promoting the unique features, current living status and the neglected needs of the elderly in DRR has gained momentum in which governments can agree to ensure that universal design and accessibility of infrastructures and services that will benefit the communities but in particular older adults.

On 14th–18th March, 2015 in Sendai, the third UN World Conference on Disaster Reduction launched a new Disaster Riskand Age Index, which captures the collision of two trends: ageing populations and the acceleration of risk in a world which is increasingly exposed to hazards. It clearly demonstrates that leaving older people out in development processes such as DRR can put the world at a greater risk as its population ages. The new Sendai Framework specifically states: "Older persons have years of knowledge, skills and wisdom, which are invaluable assets to reduce disaster risk, and they should be included in the design of policies, plans and mechanisms, including for early warning." Disasters