Community resilience factors to disaster in Saudi Arabia: the case of Makkah Province

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Abstract

Purpose: Saudi Arabia has recently experienced a number of natural disasters, including floods, epidemics and dust storms. Preparing a community to overcome disasters enhances its capacity to recover from potentially induced negative impacts. Therefore, building community resilience to disaster is a fundamental necessity for disaster management. The objective of this study is to identify the factors that can be used to improve readiness in Saudi Arabia in relation to disasters.

   Methodology: This study is based on a questionnaire survey across 13 regions in Saudi Arabia and focuses on Jeddah city in Makkah Province as a case study given its experience with flooding, in particular ones that occurred in 2009 and 2010. The questionnaire was conducted in March for two months in 2012 and resulted in 267 responses.

   Findings: The results show that a number of factors such as willingness and faith are essential to building community resilience to disaster. However, some factors which would assist in building community resilience, such as personal experience of disasters, are overlooked.

   Research limitations: This research was conducted amongst people who have access to email, consequently not allowing access to those who do not.
Keywords: disasters, community resilience, Makkah Province, Saudi Arabia.

1   Introduction

Disasters are on the increase worldwide (Becken and Ren [1], Gaillard and Texier [2]). During the past 20 years, various part of the world have been affected by natural or man-made disasters which have a far-reaching impact on the lives of the people and can also result in considerable economic losses (Jafari

et al. [3], Becken and Ren [1]). Recovery from disaster can be impacted by a lack of community resilience, not just a poor or non-existent infrastructure (Barker [4]). Hence, greater importance is now given to developing the capacity of disaster-affected communities to recover from the aftermaths of disasters, with or without overseas aid (Bosher and Dainty [5]). Therefore, a change has been required in the disaster risk reduction culture, with a stronger emphasis being placed upon resilience rather than on vulnerability (Manyena [6]).

The importance of the concept of 'resilience' in disaster discourse was confirmed by the 2005 World Conference on Disaster Reduction (WCDR), and gave birth to a new culture of disaster response (Cimellaro *et al.* [7]). Thus, concepts relevant to resilience, such as 'sustainable and resilient communities', 'building community resilience' (Manyena [6]), 'disaster resilience' and 'community resilience' have become commonplace in academic articles (Castleden [8]).

A disaster resilient community is a community that can resist disaster and is able to take mitigation actions consistent with achieving the required level of protection (Cimellaro *et al.* [7]). Research identifies eight levers of community resilience: wellness, access, education, engagement, self-sufficiency, partnership, quality, and efficiency (Chandra [9]). Developing strategies and policies that develop these levers has been revealed as fundamental to the management of disaster by assisting communities to improve their ability to withstand and recover from disasters through undertaking activities (Godschalk [10], Tidball and Krasny [11], Chandra [9]).

Saudi Arabia is not widely known for natural or man-made disasters, despite the presence of volcanic and seismic areas (Al-Saud [12]); but since 2000, the rate of their occurrence has increased (Al-Saud [12], EM-DAT [13]). In recent years, floods have been the most commonly occurring natural hazard in the Kingdom (Al-Saud [12], Alshehri *et al.* [14]). One region prone to disasters is the highly populated Makkah Province (CDSI [15]). The latter forms the focus area of the research. It lies in the west of Saudi Arabia and has a population of more than 5 million (according to the 2004 census) distributed over an area of 164,000 km² (CDSI [15]). The biggest city is Jeddah which is also the main port of the region, while the holy city of Makkah is the capital (CDSI [15]). Several instances of the natural disasters have been experienced in this region including earthquakes, floods and dust storms (Al-Saud [12], Alshehri *et al.* [14]).

Additional hazards occur during the *hajj* (Islamic pilgrimage) or in the month of Ramadan when more than three million pilgrims visit the holy places in Makkah and Medina (WikiIslam [16]). This number of visitors in a confined area poses a significant challenge for the local authorities (Memish [17]). However, Alshehri *et al.* [14] mentioned that there have been a number of tragic accidents at the hajj which have led to considerable loss of lifes over the years. For instance, more than1,000 people were trampled in an overcrowded pedestrian tunnel leading to Makkah in 1990 (WikiIslam [16]) and 346 people died due to crowding at Jamarat Bridge in Mina in 2006 (WikiIslam [16]).

   Although the government has a master plan in place to cope with disasters, this paper highlights factors that can be used to build a community resilience framework to disaster in Saudi Arabia.

2 Methodology

The main objective of this paper is to identify the factors which enhance community readiness in Saudi Arabia in order to reduce the negative impacts of disasters. Furthermore, to build community readiness, it is necessary to understand public perceptions about disasters in Saudi Arabia in order to start building community resilience to support disaster management in the country. Therefore, a questionnaire was designed which included classification questions, knowledge questions and responsibility questions. The design of the questionnaire was informed by a number of related surveys (Bird [18], PRRI [19], Spence *et al.* [20]). The questionnaire was hosted online using "SurveyMonkey" (www.surveymonkey.com) in both Arabic and English. Due to the geographic size of Saudi Arabia it is difficult to in cover the entire country; consequently, e-mail was used as the delivery method from March 2012 to the end of May (see (Alshehri *et al.* [14]).

3 Results and discussion

There were 379 questionnaires opened and 267 questionnaires completed. Among the respondents, the proportion of males was higher than that of the females. This is probably due to customs and traditions in Saudi Arabia which makes recruiting female respondents difficult (Zabin [21]). About 64% of respondents were married, of which 70% reported having children.
   The assessment of community resilience has become a difficult process due to the dynamic interactions of people with their communities, the environment and their societies (Manyena [6]). Consequently, various conceptual frameworks have been proposed and developed in order to assess the resilience of community (Cutter *et al.* [22]). For example, a conceptual framework has four dimensions include: technical, organisational, social, and economic, and are used to assess resilience (Chang and Shinozuka [23]). However, another conceptual framework has been proposed for the development of community resilience that uses five capital dimensions. These are:

1. Social capital, such as social structure, trust, norms, and social networks.
2. Economic capital (financial resources that people use to achieve and maintain their livelihoods), including savings, income, investments, and credit.
3. Physical capital, which refers to the built environment, such as public buildings, business/industry, dams and levees, and shelters.
4. Human capital, such as education, health, skills and knowledge.
5. Natural capital, such as resources, stocks, land and water, and the ecosystem (Manyena [6]).

Paton [24] highlights several elements that can be measured to assess the resilience of a community at an individual (e.g. information and advice, personal and community support) and community levels (e.g. knowledge of hazards, shared community values), on the basis of how best to manage them. While, there are indicators have been proposed by The Disaster Resilience of a Place Model (DROP) such as Demographics (age, race, class, gender, and occupation), Social networks and Community values-cohesion, Faith-based organisations, Employment (Cutter *et al.* [22]).

The current study demonstrates that there are a number of factors which indicate a certain ability of the population to be resilient to disasters. For example:

Age: This is a positive factor in building community resilience. Several studies suggest that communities in which elderly people are a smaller proportion of the population are more resilient to disaster. This can be attributed to several reasons, including the ability of a younger population to learn and access relevant information, as well as having greater income resources to cope with disaster (Manyena [6], Cutter *et al.* [25]). This research confirmed that most of respondents are within the working age supporting the positive age factor in the process of disaster management. This result compatible with static figures of population in Saudi Arabia (CDSI [15]).

Education: Education levels are an important factor in improving community resilience for a number of reasons. First, the higher the education level the greater the ability is to access information. Second, it has been emphasised that educated people are more resilient to disasters and can also help in improving the community planning (Jafari *et al.* [3]). Third, the level of education is related to the ability to understand warning information. In this paper about 63% of participants had a university degree. However the results reveal significant clear differences in the level of awareness of generators of disaster (see Table 1).

Table 1:   Respondent's knowledge of generators of disasters.

Generator of disaster	Response
Conflicts	75%
Earthquake	67%
Flood	68%
Epidemic	54%
Tsunami	46%
Tornado	40%
Volcanic eruption	38%
Landslide	31%

Economic: Economic development is an important contributing issue to building community resilience. It may be measured by many factors such as income, property value, and employment (Cutter *et al.* [25], Manyena [26]) Joerin *et al.* [27]). For example, wealth can be used directly to raise resilience through increasing the ability and capacity of individuals and communities to overcome the negative impacts of disasters. In terms of the survey, the income of

most the participants is beneficial in the sense that there is no poverty. About 66% reported being currently employed and approximately 73% stated that their income was 6,000 Saudi Riyal (≈ 1.200$) per month or greater.

Risk perception: Several studies have proved that there is a direct relationship between risk perception and the disaster preparedness (Ainuddin [28]). Risk perception can determine the response of individuals or communities to disasters (Howe [29]). For instance, a community with low perceptions of risk are likely to cope poorly with disasters, while a community which has high risk perceptions tends to behave in a positive anticipatory way to build more disaster-resilient communities (Gaillard and Texier [2]).

In this research, participants were asked to indicate the extent to which they agree that people in Saudi Arabia are at risk from disasters and whether or not they are concerned about disasters. Almost two-thirds (61%) of respondents were concerned about disasters, indicating that they are 'fairly' or 'very' concerned, while 71% either agreed or completely agreed that there are risks to people in Saudi Arabia from disasters. Slightly more than 70% of respondents think that their region could be affected by disaster; however, the vast majority (80%) have never experienced a disaster.

The survey also assessed public perception of the causes of disasters and reality. 63% of respondents believe that disasters are caused by a combination of human activity and natural processes. Furthermore, the study shows the extent of respondents' knowledge of communicable diseases that can occur after a disaster. For instance, 82% of respondents believe that a new communicable disease can threaten their community, which is consistent with several studies (Leung *et al.* [30], Kamate *et al.* [31]). In addition, about 59% of participants think that people can take action to prevent the outbreak of a new disease in Saudi Arabia.

In spite of the lack of personal experience with disaster, the study proved that there is a high degree of disaster risk perception. This is a positive indicator for building community resilience to disaster.

Willingness: Community resilience is dependent on individuals and families within the community (Van Breda [32], Zauszniewski *et al.* [33]). When there is a great level of familial responsibility, the community is better placed to respond quickly and effectively to disasters (Kulig *et al.* [34]).

The study reveals that respondents are willing to learn more about disasters, thereby positively affecting their attitudes toward preparedness. For example, they believe that they have a responsibility to help their families during a disaster event. Moreover, they have a desire to contribute to reducing the risk of disasters, and have indicated a willingness to comply with the evacuation procedures under any circumstances (Figure 1).

Furthermore, all participants were asked to rank by importance resilience factors which increase the community's ability to cope with disasters. As Figure 2 illustrates that *Raising risk awareness* was chosen as the most important factor followed in order by *Early warning system, Disaster management, Evacuation plan,* and *Prosocial behaviour during disasters.*
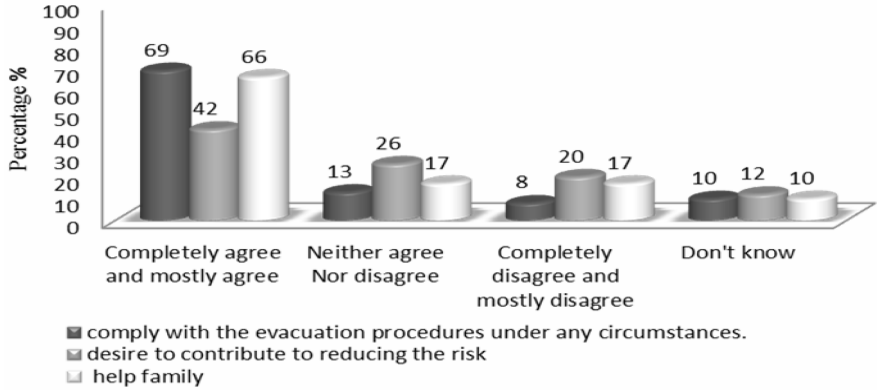
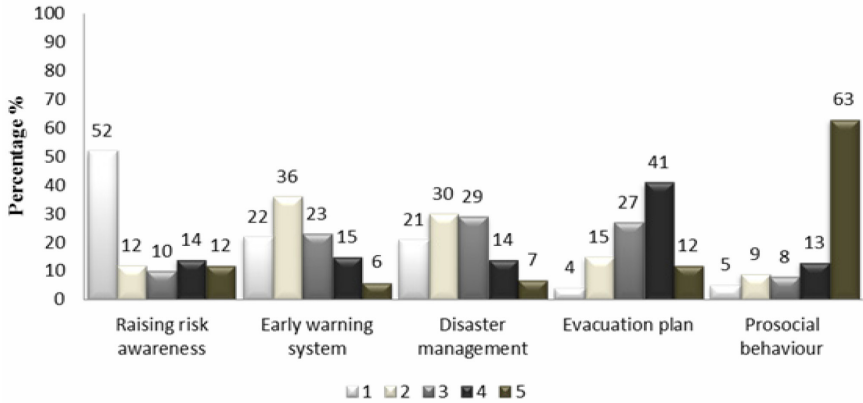Figure 1:   Responsibility towards disasters.

Figure 2:   Ranking of resilience factors.

However, a number of respondents noted that all the options "have the same priority because they believe that people are not aware of these. Also, it is a combination of community, government and individual responsibilities". Thus, numerous respondents were either unaware of emergency procedures or do not know what to do in the occurrence of a disaster, as a result of lack of awareness and training.

Importantly, one of the most significant resilience factors is religious faith (Paradise [35]). This factor is high in this study for several reasons. First, Saudi Arabia is a Muslim society, with the Holy Qur'an forming the basis for its constitution (Madani et al. [36], CDSI [15]). Furthermore, religious subjects are taught at all levels up to and including university level (Prokop [37]).

The majority of the respondents believe that God controls the world and such disasters are a punishment from God. This result broadly aligns with other studies (Alam and Collins [38], Bhargava [39], Gaillard and Texier [2], Paradise

[35]), and is drawn from the Qur'an where it is stated "So We sent on them: the flood, the locusts, the lice, the frogs, and the blood (as a succession of) manifest signs, yet they remained arrogant, and they were of those people who were Mujrimûn (criminals)" (Qur'an [40]). However, unlike the other studies (Paradise [34]), this survey determined that the respondents in general display a willingness to cope with disasters (Alshehri *et al.* [14]).

Access to sources (information and knowledge): Knowledge includes the ability to search for information, which can be collected from various formal and informal sources such as news media, experts, government officials, friends and families (Howe [29]). Through an analysis of the results of this study, it is clear that a high percentage of the participants have the ability to access sources of information and knowledge using different methods. For example, the study proves that nearly 82% of participants using the internet, while 80% of respondents receive information from the TV. Moreover, 63% prefer to use cell phones as a source of receiving information and warnings about disasters. These findings are consistent with previous studies (Spence *et al.* [41]).

However, despite the high internet use, a high percentage of participants do not use official websites provided by government including Civil Defence and, the Ministry of Health. This may be due to the shortage of previous disasters in Saudi Arabia or the participants' lack of awareness of the sites (Alshehri *et al.* [14]).

The results clearly indicate that the respondents have the ability and willingness to participate in actions directed towards building community resilience.

4   Conclusion

The resilience concept has been considered in several frameworks as mentioned in the above discussion section based on factors that contribute towards raising community resilience to disasters.

This paper has attempted to identify community resilience factors in relation to explicit indicators at the local level in the context of disasters in Saudi Arabia. The public's perception to disasters was surveyed to asses if factors deemed necessary to building to community resilience were present in Saudi Arabia. These factors included *Age*, *Education level*, *Economic, Risk Perception, Access to sources and Willingness and Responsibility*. However, other important factors, such as lack of: raising awareness, training, and knowledge regarding information access to official websites, can decrease community resilience are also evident from the survey.

The results indicate that the willingness and responsibility of most respondents should present significant opportunities to engage community members with the preparation of responses to disasters and to encourage informed action.

This paper reveals that enhanced efforts are needed to build a community resilience framework to disaster in Saudi Arabia. This framework requires further research work using the Delphi Technique in order to gather data from

respondents within their field of expertise so that community resilience towards disasters in Saudi Arabia is built.

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