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Sinabung volcano: how culture shapes community resilience

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Abstract
Purpose – The purpose of this paper is to explore how culture, including traditions and social structures, can influence resilience and how culturally sensitive relief operations can put affected people and their context at the core of any interventions.

Design/methodology/approach – A case study of the Mt Sinabung volcano area in Indonesia was undertaken. As part of the case study, an analysis of interventions was conducted, which was complemented by semi-structured interviews with Karo cultural experts and humanitarian organisations.

Findings – Culture influences the manner in which the Karo people react to volcano eruptions with varying implications for recovery. In addition, relief organisations which understand people’s actions through a cultural lens have better managed to tailor programs with long-term impact, thereby avoiding aid dependency.

Practical implications – Practical examples of disaster management activities that adequately account for the beneficiaries’ way of living prior to the eruptions are provided. Aid actors are provided with guidance concerning how to better tailor their activities in line with a cultural lens.

Originality/value – The study provides empirical grounding for claims concerning the role of culture in planning interventions in Indonesia and other similar contexts.

Keywords Volcanic eruption, Resilience, Recovery, Culture, North Sumatra, Karo, Mt Sinabung

Paper type Research paper

1. Introduction
Since 1970 the Asia-Pacific area has been impacted by more than 5,000 disasters causing 2bn deaths and affecting around 6bn people (UNESCAP, 2015). Indonesia is the fourth most populated and one of the most prone country to natural hazards in the world. There are currently 127 active volcanoes in the country. Another peculiarity of Indonesia is its internal diversity, with around 300 distinct ethnic groups and 742 different languages and dialects (Birkmann, 2008) (Figure 1).

One of the most active volcanoes in Indonesia, Mt Sinabung, is located in north Sumatra. It was categorised as “dormant” due to its 400 years long inactivity, until it suddenly erupted on 29 August 2010. The Karo District Local Disaster Management Agency (BPBD-Badan Penanggulangan Bencana Daerah), officially declared local emergency status, the lowest level of emergency. As the volcano continued to erupt, in 2013 the Volcanology and Geological Hazard Mitigation Centre (CVGHM) raised the alert to the highest level (Enia, 2016). This led to temporary forced evacuation of around 40 villages and to the destruction of three
of them. The disaster management capacity was slowed by the late establishment, on 22 January 2014, of Tanah Karo District BPBD with limited resources and capacity (OED–FAO, 2017).

The CVGHM warned villagers and tourists not to enter the 3 km radius from the summit and banned any activities within 7 km in the south-southeast-east sector and 4 km in the north-east sector (The Jakarta Post, 2017). Nevertheless, the volcanic eruptions killed seven people in 2016 (Sullivan and Sagala, 2016). Displaced communities were categorised as: relocated in Siosar (370 households), independently relocated (supposedly 1,903 households) and temporarily evacuated (2,592 households) (OED–FAO, 2017) (Plate 1).

Before the disaster, the land around Mt Sinabung was rich and fertile contributing to Sumatra leading role as vegetables and oranges producer. Since 2010 ash has covered tens of thousands of hectares of farmland and gas has ruined crops, causing economic losses of around IDR 1.49 trillion by December 2014 (Enia, 2016). Livestock farming was the second most common income activity, but the eruptions pushed many villagers to sell cattle for a low price or to abandon them (OED–FAO, 2017).

This paper traces the role of culture in the process of resilience building within the Karo community and, in wider terms, the effectiveness of culturally sensitive aid programmes aiming at improving disaster management practices (Vanhoebrouck and Sagala, 2010). Following in a recent tradition of research addressing how the cultural lens influences perception of risks and how they are mitigated (Wisner et al., 1977), the paper aims to illuminate the culturally mediated actions of the Karo people, located in an eruption-prone area, vis-à-vis the programming of INGOs, NGOs (international non-governmental organisations and non-governmental organisations) and the local government. A sketch of the relationship between the concepts of resilience and culture throughout the aid and development literature is provided followed by an account of the Karo culture and its particularities. After an overview of the methodology, the results are presented and discussed.

**Figure 1.** Mt Sinabung location

Source: BNPB (2015)
2. Culture, resilience and their relationship in the literature

A cultural turn has been identified within disaster research in recent years due to the increased attention to how culture mediates disasters and exacerbates or mitigates their impact. The interplay of belief and knowledge systems of various kinds and the importance of how external actors engage with indigenous knowledge has undergone a resurgence within the literature (Bankoff, 2003; Mercer and Kelman, 2012; Ager and Ager, 2015; Wilkinson, 2018). These developments are reflected to a certain extent in the wider policy architecture of the humanitarian sector which has increasingly recognised the importance of placing affected people at the centre (WHS, 2016). By shifting the focus from short-term disaster management to longer-term disaster risk management in the Sendai Framework for Disaster Risk Reduction (DRR) 2015–2030 greater space is provided for wider structural determinants of vulnerability, including cultural considerations (United Nations, 2015).

Nonetheless, the social and cultural determinants of the nature and extent of disasters, including those driven by volcanic hazards, often have still not been sufficiently acknowledged within research relating to volcanic hazards vulnerability (Maldonado, 2016; Usamah and Haynes, 2012; Krüger et al., 2015). Integrating different knowledge types and experiences to avoid a technical-reductionist framework helps to design projects, which will not be temporary impositions from outsiders but will permeate beneficiaries’ everyday lives (Wisner et al., 1977; Mercer and Kelman, 2010; Weichselgartner and Kelman, 2015). From a macro-sociological perspective, it has been claimed that achieving cultural resilience means perceiving the community as:

[...] social relations, combinations of mutual practices, systems of power, resources access and social roles, social functions, cultural meanings, and ties of support and trust among the local population and the institutional agencies. (Lucini, 2014, p. 154)
2.1 Conceptualization of culture

Culture is an ever-changing process, as the adaptation practices, both visible and intangible, conducted for millennia by populations prone to disasters have proved (Maldonado, 2016). Culture is liquid and influences every aspect of human existence. The complexity of this concept, particularly within the context of disaster, renders a clear definition elusive. However, when the cultural embeddedness of catastrophes is overlooked, then the nature and extent of disaster impacts cannot be fully understood (Hewitt, 2012). People tend to adapt actively and creatively to contain risks affecting the areas in which they are accustomed to live because of the repetitiveness and the predictability of certain hazards. The recurrence of risk can be an important driver of both destructive and positively transformative cultural change in the areas of politics, economics and society (Krüger et al., 2015). Thus, on the one hand, there are aspects of culture which make it a dynamic and liquid feature of society, but on the other hand there are characteristics of it that resist change because they represent the core identity of that society (Hufford, cited in Maldonado, 2016, p. 53). Much literature underlines the importance that social capital, in terms of social networks, shared values and behaviours, has in promoting the recovery of community after a collective trauma (Aldrich, 2012). These social relations and mechanisms inherited over generations are unique characteristics of communities prior to hazards and can be beneficial to the group, but not unambiguously so in every context (Aldrich, 2011). Despite this complexity, the cultural lens remain indispensable because it aids in clarifying what may prima facie appear irrational, for example emotional attachment to hometowns and livelihoods, gender roles, links within a community and characteristics which render people to opt to live in a commonly considered disaster-prone area (Dove, 2008; IFRC, 2014; Krüger et al., 2015).

2.2 Conceptualization of resilience

There is no consensus on a definition of resilience across the aid community. Resilience, originating etymologically from the Latin term resiilo (to bounce back), is now a widely used term adopted to promote cooperation between the humanitarian and development sectors. In the lucid overview of the first steps of a multidisciplinary narrative of resilience, Manyena (2006) puts the origins of this term either in ecology, child psychology or physics where it has been used to describe the capacity of certain elements to return to their original state of equilibrium in case of imposed stress (Barrios, 2014; Barrios, 2016).

Despite the latest articulation of the definition of resilience by UNISDR (2009, p. 24), the concept remains subject to multiple interpretations. These diverse definitions of resilience often conflict with one another. For some, resilience is an ontological feature of communities as an inherent capacity that is catalysed by crisis. For others, it is a phenomenological process built over time. Yet, others view resilience not only as adaptation towards difficulties of existence through change, but also as resistance to those adversities through fighting this change (CARRI, 2013); and finally, it has been defined as outcome oriented or process oriented. When viewing resilience as an outcome, the reinforcement of a more traditional disaster management reactive approach takes place, programmes try to maintain the status quo, emphasis is put on bouncing back and coping and essential DRR activities such as community capacity building and disaster preparedness are not considered. On the other hand, resilience as a process “places emphasis on the human role in disasters. Put differently, resilience is not a science, nor does it deal with regularities in our experience, but rather, it is an art that addresses singularities as we experience them” (Manyena, 2006, p. 439).

Being aware of the relationship between vulnerability and resilience within each given context is essential (Gaillard, 2010; Weichselgartner and Kelman, 2015). Every subject has some degrees of vulnerability and resilience, which are considered a response to changes and their interaction depends on each context. Estimating vulnerability by considering solely
physical and economic risks has been heavily critiqued within the disaster management sector. The resilience concept, enriched by a specific focus on community culture and context, allows DRR interventions to consider social, organisational and institutional aspects. As a result, this helps the aid community to obtain a more complete understanding of risk and vulnerability and recognise community’s coping capacities (Field, 2017; Manyena, 2006). These understandings have been particularly taken into account within research relating to volcanic hazards (Mercer and Kelman, 2010, 2012; Usamah and Haynes, 2012).

3. The Karo culture
The Karo are a clan and agriculture-centred society composed of five merga (clans) which determine the entire order of social life, the Merga Si Lima (Kushnick, 2006). There is no hierarchy among clans, neither discrimination nor special status, and they are bound to one another through inter-marriage (Slaat and Portier, 1992). The most important kinship connections are: sukut agnate, the person sharing male ancestors; kalimbubu, the wife-giver; and anak-beru, the wife-receiver. The Karo society places great emphasis on the creation and maintenance of the unity of sangkep si telu, the completeness of the three holding together the entire society and fostering a form of egalitarianism (Kushnick, 2006; Slaat and Portier, 1992). The set of rules, behaviours and actions directly influenced by those regulations which shape the kinship system are at the foundation of Karo society.

The Karo kinship system is predominantly patrilineal. Women are traditionally responsible for the private sphere, including family and financial management. From a young age, Karonese women are taught to help with domestic tasks in order to be prepared for marriage. From a general perspective, women in Indonesia feel a sense of duty and sacrifice towards their families. For this reason, in addition to domestic work, Karo women also labour in the fields. Furthermore, as a result both of an unequal access to knowledge and of custom, men have a main role in conducting ceremonials and in solving community issues. On the other hand, through wife-receiving the clan is perpetuated and alliances and bonds are formed among clans.

Taneh Karo derives its prosperity from two sources: its favourable location and Dutch capitalism. The fertility of the volcanic topsoil and the tropical climate, without extreme seasonality, are optimal conditions for cash crops and rice, vegetables and red pepper for own consumption and market (Kushnick, 2006). Nowadays, Karo living in urban areas tend to be small entrepreneurs, owners of vehicles and drivers and those with higher educational backgrounds to enter the professions (Marbun, 2009). However, a limited number of people conduct activities outside crop farming and livestock caring. The little variety in terms of occupation within villages, the wealth brought by good harvests and the ancestral attachment to farming resulted in the constitution of a system of rights to protect the land mirroring the Karo societal structure. If the land has been inherited from patrilineal ancestors, there is a sacred bond and it cannot be sold but needs to be managed by the male members of the group. While the territory has been passed over by the kalimbubu, the woman can use the land throughout her entire life (Slaat and Portier, 1992).

Karo sense of unity is reflected in the runggun, an institutionalized process of decision making by consensus used for settlements between parties or individuals. Through it, Karo individuals are underlining their unity as society, where each person’s opinions are weighted according to their ability to contribute to the common good. The overall goal is always the community’s harmony as a living unit according to the concept of kebulatan kehendak, the roundness of the wills that represents the wisdom of communal decisions (Van den Steenhoven, 1973). Recently however, many people use the official governmental channel to address land issues that might arise because of the length of this process (Slaat and Portier, 1992). Another proof of this communal characteristic typical of Karo villages is the jambur, men’s gathering, a communal facility built at the centre of the village and used for customary deliberations and traditional ceremonies such as weddings or funerals.
A form of animism called *agama pemena* was the Karo’s original religion that featured the adoration of spirits, cosmology and ancestor worship. Most Karo are now either Christian or Muslim but their culture displays considerable syncretism.

4. Methodology
A single qualitative case study of the Karo people’s relationship with the Mt Sinabung volcano eruptions was undertaken to pursue the paper’s objective of understanding how culture, including traditions and social structures, can influence resilience and how culturally sensitive relief operations can put affected people and their context at the core of any interventions. Key informant interviews were conducted with two categories of respondents as detailed in Table I. The first category included experts of Karo culture. The second included aid organisations, United Nations agencies and NGOs, that were engaged in the response and recovery in the aftermath of the 2010 eruption. The primary objective in the selection of respondents was to achieve information power (Malterud *et al*., 2016). These primary data were complemented by analysis of a range of secondary sources including media reports, UN and NGOs reports and project evaluations. The study involved inputs and feedbacks from several ethnic Karo experts.

5. Results and discussion
There are several Karo cultural features that have served to both facilitate and obstruct the recovery of those affected by the Mount Sinabung’s eruption. These features include its strong social bonds and cohesion, its traditional agricultural practices and gender roles.

5.1 Social cohesion and fracture
The Karo people’s sense of village belongingness has served to activate mutual assistance mechanisms, but only within villages and kinship structures. Groups that prefer a communal way of living rather than an individualistic one find sources of growth within the sense of togetherness. The concept of *Tutur Siwaluh*, meaning brotherhood, helped the Karo villages that were independently relocated or displaced to the newly formed Siosar IDP camp (Wulandari *et al*., 2018). The Karo have always shown a strong sense of self-help and mutual assistance in terms of kinship and their society organisation, which reflects clan affiliation. Karo kinship and unity displays similarity with *gotong royong*, a common practice in Indonesian culture where community’s cooperation is possible through consensus and collective deliberation (Effendi, 2013). Communities near Mt Merapi and Mt Kelud volcanoes helped each other reconstruct houses destroyed by eruptions and clean ash fall deposits, which gave a significant contribution for recovery process (Andreastuti *et al*., 2016; Lestari *et al*., 2012; Mei *et al*., 2016). Similar cooperation for logistics preparation in IDP camps was also apparent during Mt Sinabung post-disaster recovery process (Andreastuti *et al*., 2016). However, in the present case the pattern of strong kinship ties can lead to tensions within broader communities as the Karo are not willing to resettle with others, preventing the success of the independent relocation approach and displaying disunity outside their own village. This finding supports the literature concerning the somewhat ambiguous contribution of social capital to resilience.

UNDP, which had stronger contacts with governmental institutions than with the affected population, tried to communicate to the government the importance of taking into account Karo cultural background within the relocation process. Although the government’s aim was to rapidly apply the independent relocation scheme, distributing money to rent or buy a house, it was not feasible. According to the Karo cultural identity, moving to another village meant engaging in a cultural process which could not be quickly imposed, but required consultation and dialogue with the communities to be relocated and those in the area to which the relocation was being undertaken.
The government and the aid machinery cannot ignore Karo’s difficulties in merging different villages because of their sense of solidarity only within kinship, but they need to find a balance between the Karo willingness of helping each other and the obligations that a volcano erupting brings to them. A territorial identity needs to be safeguarded, but in case of altered conditions a certain degree of change needs to be implemented, as long as it is not subversive:

The village is a group of family members, moving from one village to another requires a cultural process; they need approval from the community leader […] there are cultural barriers that government needs to address. UNDP needs to give the government the background concerning how to convince the community to receive new members […]. (Respondent, UNDP)

<table>
<thead>
<tr>
<th>Key informant</th>
<th>Organisation</th>
<th>Key information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project and Programme Manager</td>
<td>United Nations Development Program (UNDP)</td>
<td>Coordinating role within the multi-agency SIRESUP initiative (Mt Sinabung Recovery Support Programme) with ILO and FAO, strong cooperation with the government</td>
</tr>
<tr>
<td>Local Project Coordinator</td>
<td>International Labour Organization (ILO)</td>
<td>Responsible for trainings on sewing, automotive services and light meal production as alternative livelihood to recover from eruptions</td>
</tr>
<tr>
<td>Indonesia Programme Staff, support projects monitoring</td>
<td>Food and Agriculture Organization (FAO)</td>
<td>Leading the restoration of livelihood through agriculture and trainings for alternative agricultural cultivation that is resistant to volcanic ashes</td>
</tr>
<tr>
<td>Preparedness and Response Unit and Regional Disaster Response Adviser, Head of Regional Office</td>
<td>United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)</td>
<td>Coordinating and cooperating with all actors involved. It witnessed the general collective solidarity across displaced communities</td>
</tr>
<tr>
<td>Executive Director</td>
<td>Yayasan Pusaka Indonesia (YPI) (NGO)</td>
<td>Conducted immediate response targeting evacuation centres and recovery activities such as cash grant distribution</td>
</tr>
<tr>
<td>Executive Director</td>
<td>Pendidikan Khusus Profesi Advokat (PKPA) (NGO)</td>
<td>Responsible for an alternative livelihood community programme involving quails breeding</td>
</tr>
<tr>
<td>Project Coordinator</td>
<td>Indonesia Bhadra Utama (Ibu) Foundation (NGO)</td>
<td>Supported an Internally Displaced People (IDPs) camp in partnership with a Sumatra based organisation, through beneficiary-led WASH (water, sanitation and hygiene) activities, psychological and psychosocial assistance (crafting and supporting religious initiative) and volunteers’ training on DRR</td>
</tr>
<tr>
<td>Expert</td>
<td>Karo Culture</td>
<td>Karo 5 clans society, kinship system, sense of brotherhood within villages and mutual assistance mechanisms</td>
</tr>
<tr>
<td>Expert</td>
<td>Karo Culture</td>
<td>The importance of communal traditions and buildings as Jambur</td>
</tr>
<tr>
<td>Expert</td>
<td>Karo Culture</td>
<td>Difficulty to be competitive in business-like activities not connected to farming</td>
</tr>
<tr>
<td>Scholar and Lecturer</td>
<td>University of Leiden</td>
<td>The resilience within the extended family connections and communal way of living. Role and importance of religion to the Karo</td>
</tr>
<tr>
<td>PhD in Karo ethnomusicology and customs, traditions</td>
<td>University of North Sumatra</td>
<td>Centrality of agriculture and farming. The role of women within Karo culture</td>
</tr>
</tbody>
</table>

Table I. Profile of key informant participants, 2017

DPM 28,3
However, social cohesion is also a facilitator of learning, particularly when adapted to the cultural context:

Karo people are not individualistic; they do communal things and have strong family bonds. If we give capacity as community, the sustainability will be higher than with individual activities. They can learn from each other and cope with problems by themselves. (Respondent, PKPA)

The most direct way to address beneficiaries and to give them ownership of their resilience is through the facilitation of communal initiatives. Both the Bandung-based NGO Ibu Foundation and UN agency ILO engaged in these initiatives. Ibu Foundation with its 15 years of experience in the field of post-disaster emergency assistance supported IDPs in their effort to lead WASH activities in the “Posko Pengungsian Lapangan Futsal Kabanjahe” camp. The engagement of beneficiaries was strong (seven toilets and two bathrooms were completed in less than two weeks) and this helped cultivate a sense of ownership and normalcy (Ibu Foundation, 2014). ILO, using its long standing expertise in the transmission of hard and soft skills to improve technical knowledge and practical abilities such as administration, marketing and financial calculation to build the capacity of micro and small enterprises and ultimately to recover from the eruption, supported the IDPs to establish a cooperative in Siosar as previously the nearest market was 17 km away. Now by providing basic goods to stimulate the business, like building a store, creating a small market, distributing grocery and conducting training on bookkeeping, the living conditions in the area and the sense of cohesion improved (ILO, 2017).

5.2 Agriculture, wealth and livelihood diversification

The Karo ancestral attachment to agriculture, as a mean not only of mere survival, but also of wealth, hinders the diversification of livelihood after the volcanic eruption resulted in vast swathes of Karo land being covered in ash. Nonetheless, as they are experienced in this activity and it is part of their identity, they welcome any interventions designed to promote livelihoods connected to it such as food processing. With the scarcity of land some are also willing to engage in business activities as long as they are complemented with farming. On the other hand, because before the eruption they had been wealthy landowners who generated significant revenue with a single harvest, they find it difficult to readjust to the new condition of poverty and tend to mismanage their money, particularly the case of men.

This two-fold implication of Karo traditional attachment to farming has been identified by needs assessments and by the UN organisations (ILO, UNDP and FAO) involved in the SIRESUP programme which was developed in collaboration with the local government to promote recovery. In order to address livelihood diversification, ILO, aware of the limited willingness of Karo population to radically change their traditions, decided to adapt its livelihood diversification activities. As a small-scale project, it transforms the livelihood of not more than a dozen beneficiaries. It is on trial, meaning that it will be continued only if the quality of the products and the market will be stable. ILO cooperated with FAO in conducting trainings about food processing businesses in order not to distance their activities too much from agriculture:

Most of our beneficiaries are also ILO’s [...] farmers who have been trained in creating the product by us are then trained by ILO in managing the product when entering the market, how to finance it [...]. (Respondent, FAO)

FAO held alternative cultivation trainings, which gave Karo the opportunity, despite the scarcity of land, to cultivate ash and heat resistant crops. Agriculture and the routines and practices involved are central to the Karo. Even if some might have adjusted to alternative income, doing what for generations they have been used to do is much more reassuring in an environment which keeps on changing.
Again, the NGO PKPA, through a context analysis, realized that its project on alternative livelihood (quails breeding) had to use a community training approach in order to be successful. This meant that they had to address a community of farmers in each of the three villages which composed Siosar camp, instead of targeting individual farmers.

One of the ILO’s main focuses within the joint programme was financial literacy. Throughout its experience among the Karo IDPs, the UN agency noticed how despite the disaster and subsequent relocation, people were still engaged in gambling, spending money on new clothes for traditional celebrations or simply eating at the restaurant because they did not like the rice distributed by the government thinking they would return to their lands soon. Financial literacy within business and alternative cultivation trainings was a core focus of both FAO and ILO to address the gap concerning livelihood activities left by the Renaksi, the governmental recovery plan.

5.3 Impact of disaster on traditional gender relations
Karo society is patrilineal and the division of work is not equally distributed between men and women. Nonetheless, women’s roles as housekeepers and family carers give them a prominent role in the community as they take responsibility for the household finances, both through the management of finances, including grants provided by aid organisations, and through working on farms. Despite traditional Indonesian roles, the decline of farming and the requirement to diversify livelihoods the labour market participation of women has increased:

Now often we see that women are involved in outside jobs, livelihood activities and domestic care […] Women have a strong influence because they are hard workers and do multitasking jobs [sic] […] (Respondent, Karo expert)

ILO addressed the confinement of women’s role through livelihood diversification trainings, which has given the opportunity to single women to be able to conduct sewing activities at home and simultaneously take care of their children (ILO, 2017). Similarly, the NGO Yayasan Pusaka Indonesia enhanced their status of family finance manager and faced the gambling issue among Karo men by targeting only women for a cash grant programme:

It is usual for men to gamble after work, every day in the village coffee shop, playing cards for money. In our project we delivered cash grants by inviting just women to collect them because we know about the habit […] all the women said not to give the money to the men, they would not come home and will gamble. (Respondent, YPI)

It is well recognised that disasters are gendered events (Reyes and Lu, 2016; Bradshaw and Fordham, 2015). However, the literature has tended to focus on the detrimental impacts on women and girls rather than the enabling dimension. With the loss of agricultural lands, decline in farming as a feasible livelihood, the Sinabung eruptions, together with the response of external actors, can be seen as having a net redistributive socio-economic impact in terms of gender relations. While the negative impact of disaster on the position of women has been well-documented, the favourable shifts in gender relations that the impact of a disaster and recovery interventions can facilitate for women ought to be subject to greater investigation.

5.4 Religion, spirituality and post-traumatic growth
Post-traumatic growth in response to suffering has been documented in several post-disaster contexts, for example in the aftermath of the Merapi eruption of 2010 (Subandi et al., 2014). In the Sinabung context, Karo have obtained solace in religion, whether Christianity, Islam or animist practices. Due to its connection with a local organisation the NGO Ibu Foundation (2014) understood the positive effect that religion has on the psychological and psychosocial health of many IDPs and facilitated the community
organisation of religious activities and practices. In addition, UNDP suggested to the
government to build in Siosar those facilities essential for enhancing Karo village
belongnessness such as churches, mosques and Jambur.

Providing religious space to Karo is not sufficient to recreate the environment prior to the
disaster in the areas of resettlement. Karo spirituality tends to eschew the western
approaches to religion that emphasises practices. Although animism is not commonly
performed as before colonisation, it is still integrated into the belief system of those who
consider themselves Christian or Muslim. In the face of the immense power of the volcanic
hazard, they pray for protection as a cultural response to extraordinary circumstances:

After Sinabung erupted there was a traditional ritual ceremony held to request Mother Earth not to
hurt the Karo. They were praying and giving offering for instance, the head of goats or chickens
(Respondent, Karo expert)

However, there is no homogeneous reaction in terms of spiritual practice:

(…) with animism the disaster is a message to change the behaviour (…) they put offerings as close
as possible to Mt Sinabung hoping it will reduce the potential of disaster (…) also for Christians and
Muslims it is a test from God, they can escape from the situation through prayers which give them
calm and positivity for future (…) there is a debate in the community: some think that the current
disaster is due to the sin of Karo society such as gambling and they can stop it with praying. For
others, disaster is just accepted destiny, not related to spiritual things, so there is no spiritual effort
that needs to be done. (Respondent, Karo expert 1)

The literature identifies that local communities not only tend to experience a stronger
religiosity and sense of togetherness in the aftermath of disasters (Christia and Helleve,
2012; Dove, 2008; Lavigne et al., 2008) but can also lead to divergent spiritual explanations
being articulated (Schlehe, 2010). The present case study highlights both processes:
increased religiosity on the part of some and discordant interpretations of the spiritual
significance of the disaster.

6. Conclusion

The paper presents an unusual case within the disasters literature as Mt Sinabung had
previously been dormant for several centuries. This means that the indigenous knowledge in
terms of creatively dealing with hazards, which became a common concept in the literature
concerning resilience, was not present. For this reason, it has been challenging for organisations
to construct alternatives for the Karo which took their cultural practices into account. Krüger
et al. (2015) state that it is the frequency of risk which eventually encourages cultural change,
emphasising the idea that culture is a liquid concept in a dynamic state. As a result of the relative
novelty of the eruptions, the Karo have not shown immediate radical cultural change.

Therefore, if culture is considered, the organisations can see the disasters’ consequences
as socially driven. Consequently, the disaster is not addressed superficially that would
provide temporary and limited solutions and would aim at merely hazard resistant
communities rather than “communities able to anticipate, manage, recover and transform
from shocks” (Kindra, 2013). In other words, resilience is a phenomenological process of
adaptation towards difficulties of existence through both change, where it is needed,
and preservation, where it is possible. This paper does not mean to romanticise culture.
However, it is a powerful feature of human life that can either hinder or support a
population’s coping mechanisms. Getting closer to a community culture and traditions
means making a step further towards efficient aid and development projects, which truly
push for local resilience involving unconventional responses. Meanwhile, humanitarian
organisations, which do not consider in advance cultural peculiarity while planning for
activities, might be overwhelmed by the failure of common assumptions (Krüger et al., 2015).
The Karo case study proved the importance of culture as the starting point to determine needs based on social understanding of a community and to support their resilience. In this field, it is essential to gather information about as many realities as possible in order to be prepared and truly see the possibilities that culture is able to shape for the resilience of affected communities. As highlighted, a community and its culture cannot in every context be considered as heterogeneous.

Disaster response and management should go beyond solely event-focused reactions in order to embrace its role as an integral part of a larger development context which does not only aim at returning to pre-disaster normality. Not integrating cultural heterogeneity in the narrative of resilience inevitably exacerbates vulnerability. To overcome a generalised-fixed vision of resilience and risk, the underlying causes of vulnerability need to be considered (Weichselgartner and Kelman, 2015, p. 262).

Placing the targeted population at the centre of every activity means weighing with care both vulnerabilities and capacities stemming from the very being of that community. For this reason, organisations need to be aware both of the forces derived from social capital, networking, local knowledge, etc., and of the vulnerabilities that these centuries old traditions are cementing into society’s reactions to shocks. Simultaneously, it is important to consider that some vulnerabilities can be addressed more easily than others because they are not touching the core identity. In fact, in case they do, a cultural process involving behavioural change needs to be undertaken, thus demanding sensitivity and time (Manyena, 2006). The case study highlights once again that there is no single approach to communities affected by hazards and that it can be difficult to disentangle the features of culture contributing to resilience. Nevertheless, even if cultural features are considered obstacles to successful recovery, they cannot simply be erased and change cannot be forced. Ultimately, in order to adapt and survive after a shock, a community may be willing to change some aspects of its culture that do not infringe on its core values.

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Conflicts in adaptation: case studies from Nepal and the Maldives

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Abstract

Purpose – Adaptation appears to be regarded as a panacea in policy circles to reduce the risk of impending crises resulting from contemporary changes, including but not restricted to climate change. Such conceptions can be problematic; generally assuming adaptation as an entirely positive and non-conflictual process. The purpose of this paper is to challenge such uncritical views, drawing attention to the conflictual nature of adaptation, and propose a theoretical framework facilitating the identification and analysis of conflicts in adaptation.

Design/methodology/approach – The study is based on case study research using first-hand narratives of adaptation in Nepal and the Maldives collected using qualitative interviews, participant observation and document analysis.

Findings – The findings identify conflicts between actors in, and around, communities that are adapting to changes. These conflicts can be categorized along three dimensions: qualitative differences in the type of conflict, the relative position of conflicting actors and the degree of manifestation of the conflict.

Originality/value – The three-dimensional Adaptation Conflict Framework facilitate analysis of conflicts in adaptation, allowing for a critical examination of subjectivities inherent in the adaptation discourses embedded in disaster risk reduction and climate change adaptation research and policy. Such an inquiry is crucial for interventions supporting community adaptation to reduce disaster risk.

Keywords Nepal, Adaptation, Conflict, The Maldives

Paper type Research paper

1. Introduction

Adaptation to socio-environmental changes is central to the survival and well-being of communities and has long been the subject of inquiry in the social sciences (Simonet, 2010). A rich lineage of understanding adaptation incorporating simultaneously occurring socio-environmental changes and related risks exists (Butzer, 1980). But recent discourses increasingly retrofit the concept as a beneficial technical and managerial effort to reduce climate risk, and thus runs the danger of reinforcing abandoned functionalist views and conceptualizations of the environment that render it static (see Head, 2010; Watts, 2015).

Such unreflective conceptualizations then obviate any discussion on the potential link between conflicts of non-violent nature and the adaptation efforts made by individuals and communities, in a particular political economic context (Nightingale, 2017). Although perspectives rooted in political ecology have sought to critically highlight its political nature and related conflicts (Watts, 1983; Martinez-Alier, 2003), frameworks to coherently analyze and categorize conflicts in relation to adaptation requires much work (Nightingale, 2017).

The purpose of this paper is to contribute toward filling this gap, through increased understanding of different dimensions of conflicts in adaptation and proposing a framework that coherently includes these dimensions to facilitate understanding of the complex nature of conflicts. Although the framework is based on narratives from geographically specific
localities, it could serve as a starting point to understand and address conflicts in adaptation efforts to reduce risk more generally. To achieve this purpose, the paper attempts to answer the following research question:

RQ1. What conflicts emerge between actors in and around communities adapting to reduce risk in Nepal and the Maldives?

2. Theoretical framework
Adaptation is here defined as “those processes by which a population attempts to achieve a ‘working relationship’ with its environment” (Agnew, 1981, p. 106), in the broadest possible sense. Influential accounts describe adaptation in relation to such working relationship in terms of reducing risk (O’Brien and Holland, 1992; Agrawal, 2008). Here risk reduction relates not only to rapid onset of hazard events, but also to the regular and everyday risks related to livelihoods and well-being (Hewitt and Burton, 1971).

Such conceptualization follows from the understanding that individuals and communities rarely adapt to a specific risk or a change in their environment in isolation, but to simultaneously occurring long-term, incremental and sometimes abrupt, social, political, economic and biophysical changes (Parsons and Naal, 2016). Adaptation itself involves change. But what distinguishes a change from adaptation is the motivational core in response to risks (Thornton and Manasfi, 2010). The environment is here not restricted to a physical sense of the term alone, but includes also social practices that are constantly shaping and changing the physical characteristics of environment itself (Castree, 2001).

Nepalese and Maldivian communities have experienced significant changes in recent decades that have shaped risks over time. Nepal started to open up its economy in the 1950s and the Maldives in the 1970s to generate economic growth. This process of increasing global interconnectedness poses a risk to the viability of local traditional livelihoods and creates demands on them that shapes local livelihoods and culture (Nepal, 2015). The response has been in the form of transformation of livelihoods toward cash crop production in Nepal (Takahatake, 2001) and commercial fishing in the Maldives (Athukorala, 2004), and toward tourism in both countries (Brown et al., 1997). Accompanying this was a cultural shift in their world views oriented largely away from spiritual toward a commercial logic in Nepal (Spoone, 2011) and desire for modern amenities on the islands (Baldacchino and Kelman, 2014). Noted examples of adaptation processes in response to these globally driven changes involved changes in land use to cater to increasing commercialization (Takahatake, 2001), infrastructure development (Kothari and Arnall, 2017), migration and innovating new techniques of production (Nepal, 2015). These adaptation processes have directly and indirectly help to reduce everyday risks associated with livelihoods and well-being (see Lama et al., 2017). However, it also involved alteration of local fishing rights (May, 2016, p. 6), loss of traditional methods and techniques vital for long-term food security in communities (Mercer et al., 2007), gendered impacts (see Doma Lama, 2018), and polarized religious sentiments in the Maldives (Scheyvens and Momsen, 2008).

Thus, contradictions and contestation have been part of adaptation efforts by communities and government entities within the above mentioned changing environmental context. This is not to imply a linear relation between adaptation as one-off effort that leads to a one-time outcome in the form of conflict, or that adaptation is conflict for that matter. Rather the focus is more to understand it as a process through which multiple incompatibilities occur and unfold, shaped by the context (see Le Billon and Duffy, 2018).

Changes in values, norms, beliefs and interests have long been suggested as potential sources of conflict within and between communities (Gulliver, 1961; Barth, 1967). However, conflicts are not only related to goals, objectives and interests, but also to emotions and
interpersonal relations (Coser, 1956; Pelled, 1996; Korsgaard, 2008). Consequently, it becomes important to understand that conflicts exist on multiple levels (Korsgaard, 2008) and emanate from multiple sources (Sirkeci, 2009). Conflicts can be categorized based on the positions of the involved actors: intrapersonal, intragroup and intergroup (Rahim and Bonoma, 1979). In other words, a conflict can take place in one person’s mind, between actors in a group, or between groups. Moreover, conflicts can also be categorized based on their degree of manifestation. In this respect, Pondy (1967) suggests five stages of a conflict episode: latent, perceived, felt, manifest and the aftermath, which may be in fact be another latent conflict. Finally, conflicts can also be a positive force needed to question established worldviews (Jarvis, 2014) and propel efforts toward social and environmental justice (Fischer and Hajer, 1999).

3. Methodology
The paper is based on case study research in Nepal and the Maldives (Figures 1 and 2), with multiple cases in each country to elicit a rich picture allowing analytical generalizations rather than universal truths (see Flyvbjerg, 2001). Cases were selected based on the extent each had been affected by the complex combination of social, political, economic and physical changes described above. To study the influence of these global level processes, tourism was used as a proxy to select cases spanning from having as little to as much tourism as possible. In Nepal, Khumjung was selected for having much tourism, being located along the Mount Everest trek route within the Sagarmatha National Park. Kengma and Buksa were selected for having little tourism, but still affected as some of the villagers are seasonally employed as mountain trek
guides (especially Sherpas living in Kengma). Ingla was selected for not having any tourism, focusing instead mainly on commercial agriculture.

In the Maldives, Maafushi was selected for being a tourist island, while Kudafaari was selected for being a non-tourist island (although that appears to be changing). Data were collected between December 2014 and March 2016. Nepal was visited both before and after the 2015 earthquake.

Data were collected using qualitative interviews (Tables I and II), participant observation of village folk and respondents while helping them in their daily chores, participating in village celebrations, and analysis of policy documents. The interviews were not focused on eliciting data about conflict, but aimed to collect narratives about changes over time in their immediate environment and adaptations to them. Nevertheless, the data were rife with complex accounts of conflict. This use of multiple sources of data has been suggested to facilitate exposing deviant issue that were not the primary object of study (see Firestone, 1993), which was crucial for identifying conflicts.
To collect narratives of significant changes and adaptations over time, a purposive criterion of 50 years and above was adopted. This was facilitated by snowball technique and the assistance of locally recruited research assistants. Interviews were conducted in Sherpa and Nepali languages in Nepal, and in Divehi in the Maldives. Non-natives and key informants were also interviewed, focusing on their personal and professional experience of living in that community, and expertise on issues (Table II).

Narratives regarding significant life episodes served as an explanatory tool to understand emerging issues in-depth (Sandelowski, 1991), e.g. changes in livelihood, community bonds and surroundings. Participant observation allowed for observing verbal and non-verbal interaction among in the study site that enabled better understanding of the context (DeWalt and DeWalt, 2002).

The interviews were recorded and transcribed into English, followed by analysis. First, the interviews were subjected to a coding process to provide insights into causal condition, context, intervening conditions and consequences of a phenomenon (Corbin and Strauss, 1990). This together with annotation, memos and existing literature, serving as “sensitizing concepts”, helped make analytical generalization rather than universal statements (Bryant and Charmaz, 2007, p. 7). The analysis was supported by the use of the NVIVO software.

4. Results
The following section is structured after the three main dimensions of conflict in adaptation that emerged from analysis: qualitative differences in types of conflict, the relative positions of conflicting actors and the degree of manifestation of the conflict.

4.1 Qualitative differences in types of conflict
The analysis identifies four distinct qualitative categories of conflicts: ends conflict, means conflicts, norm conflicts and attribution conflicts.

4.1.1 Ends conflicts. The most common type of conflict found in the study is a form of goal conflict in which actors pursue contradictory, or at least incompatible, ends. An example of this type of conflict can be found around the widespread use of Fish Aggregating Devices (FAD) in the Maldives, which was a repeatedly raised sustainability concern:

Skip jack tuna was done until late but now with increasing demand reef fish and yellow fin tuna fishing is done […] It is business, and competitive, fish aggregating was supported by the government […] it interferes with the natural cycle. (Male, 62, Kudafari, the Maldives)

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal (Round I and II)</td>
<td>36</td>
</tr>
<tr>
<td>The Maldives</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Affiliation of key informant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nepal</td>
<td>Village development Head, Namsaling Development Cooperation, Hillary Foundation in charge, Former administrative district head, Buffer Zone Committee Member, Police officer, Nawa traditional head</td>
</tr>
<tr>
<td>The Maldives</td>
<td>2 Island Councilor, Women Development Committee head, Environmental Protection agency employee, Non-governmental Organization (2 employees)</td>
</tr>
</tbody>
</table>
The use of FAD started in the Maldives in 1981, and is still encouraged by the Ministry of Fishery and Agriculture, with the objective of increasing the country’s fish production in part to reduce socio-economic risk. Export and tourism demands have a large role to play in this change of fishing technique. It seems to have worked, perhaps in combination with other measures, as national statistics show a clear departure from the stable, annual production of between 30,000 and 40,000 metric tonnes in the 1970s, to 80,000 in 1990; 120,000 in 2000; and around 185,000 in the record years of 2005 and 2006 (FAO, 2013). However, a closer examination indicates internal policy conflict between the environmental and economic goal, as the end goal of “creating an environment conducive for growth and generate employment” appears contradictory to the end goal of “environment sustainability,” both of which constitutes end goals of the Maldives NAPA. Another example of end conflict pertains to the Maldivian Government’s adaptation efforts to reduce disaster and climate risks stated in the Maldives INDC (2016) and the Maldives NAPA (2006). The key adaptation measures described in these documents reveal a heavy reliance on developing critical infrastructure, e.g. traditional coastal protection, harbor development, supported by a “Safer Island” Strategy (see the Maldives NAPA, 2006 for details). This policy focus has resulted in several end conflicts where the end goals do not appear to resonate with those of the local communities and key informants included in this study:

When you talk about adaptation those are the stupidest things that you can come up with […] reclaiming the land […] reclaiming the reef will actually make it worse. (NGO representative)

It is typical of the Maldivian community to ask governments for harbours when it actually causes a lot of damage to the island. Look at the erosion due to lagoon dredging. The Environment impact assessment is insufficient with officials finishing it within two days. (Male, 53, Kudafari, the Maldives)

In the case of Nepal, similar examples of end conflict can be traced to the use of forest resources within the Sherpa community, which is closely related to their livelihood security. The rapid growth in tourism in recent decades has increased the need for wood for construction and fuel, pitting the end goal of economic gains against the end goal of environmental sustainability, and essentially dividing the community:

This time after the earthquake Ranger Sahib placed Transa along the roads, encouraging people to cut trees during his tenure. In normal circumstances, this would not be allowed […] We could not stop the community when the Ranger Sahib himself gave the order […]. (Male, Sherpa, Buffer Zone Committee member)

The matter was further complicated when the Nawo (the traditionally elected Sherpa forest guardian), and more environmentally minded members of the Buffer Zone Committee pleas were ignored.

4.1.2 Means conflicts. The analysis also illuminates conflicts that emerge when actors pursue common ends when adapting to complex combinations of changes, where the applied means undermine or clash with at least one actor’s potential to achieve the end goal. These are referred to as means conflicts and can be illustrated using the same examples from the contexts described above. In the Maldivian case, even if the local fishermen in Kudafari and Maafushi share the overall government goal of increasing their catch, the use of FADs attracts international commercial vessels with an unparalleled capacity for catching fish, leaving little for local fishermen, or as one participant states:

Yes, the FAD was a big blunder. If there was a bait plankton at a specific spot, I could find the fish on the radar and go fishing. International boats are coming in and using nets in Maldivian waters. (Male, 56, Kudafari, the Maldives)

One of the participants also (a fisherman on the island) pointed out lack of facilities, on behalf of the government, to support fishing and instead having to turn to resorts to maintain demand.
Similarly, the government sponsored infrastructural means to combat coastal erosion are at odds with traditional means of using sandbags and tree plantation by communities. Although most agree on the end goal of protecting islands from erosion, the means of reaching that end are in conflict with each other.

4.1.3 Norm conflicts. The third type of conflict that emerges from the data is unrelated to goals as such, but is instead based on conflicting norms, which determine what is accepted by, and aspired to, by different actors. Although such conflicts can be framed in terms of contradictory goals, they involve socially constructed rules and deserve distinction.

The example here is drawn from one of the controversial land use changes in Maafushi. In particular, the bikini beach—a part of adaptation process in relation to economic changes—opposed by the local community as an attack on their traditional norms. Viewing this simply as a goal conflict between two ends (turning a pristine beach into a guesthouse business vs maintaining traditional customs) underestimates the depth and the complexity of the issue. Especially as it represents a paradoxical case where claims about threatened traditional norms co-exist with pro-tourism benefits. In this case, traditional norms trumped financial ends, even leading on one occasion to women tearing down the fences around the bikini beach area:

There are advantages, more income, development. The disadvantage is that they are wearing bikinis, and for the local people there is no place for picnics. (Female, 67, Maafushi, the Maldives)

The most negative thing is that how we are a 100% Muslim society and how many things contradict the basic institution of Islam. (Male, Director of the Council, Kudafari, the Maldives)

The conflict over the fences around the bikini beach also involves ends financial end of tourism clashing with the end of maintaining freedom of movement. Female interviewees, in particular, point out how their mobility around the island had been limited by this land use change.

Another example of a norm conflict comes from Nepal, where tensions were visible between the native Sherpas in Khumjung and Kengma and non-natives, known by the Sherpas as people from Oul (i.e. a warmer climate). They were described by many Sherpa participants as having no affinity with Sherpa customs, especially concerning nature. The analysis reveals that Oul people had adopted migration to Khumjung to secure livelihoods and to educate their children, and many claimed that given the choice, they would be happy to leave such “inhospitable conditions.” Considered as outsiders, many stated that they could not access compensation or basic assistance after the 2015 earthquake.

4.1.4 Attribution conflicts. The fourth and final type of conflict emerging from the data has less to do with values, and more with blaming others for negative outcomes, referred to as attribution conflicts. This type of conflict is here exemplified by natives blaming non-natives for environmental degradation in mountainous areas of Nepal, and the community blaming resorts for the various problems afflicting small atolls in the Maldives.

In Khumjung, the diminishing forest, and partially the contamination of sacred sites, is blamed on the people from Oul. Although it is arguably the case that many non-natives engage in exploitative activities such as collecting wood, construction work and agriculture, the vast majority of them do so because they are hired by Sherpas who own the means of production, and require labor. Although there are no clear conflicts regarding ends or means, nor necessarily any conflicting norms, there is a conflict over who is to blame for the deteriorating environment.

Similarly, participants in the communities on Kudafari and Maafushi in the Maldives attribute the growing waste problem in the Maldives simply to the activities of resorts. There is no question that resorts produce a lot of garbage, also confirmed by a participant from the Environmental Protection Agency:

The problem is that even the resorts are taking it to the islands, they don’t want to burn it. They deviate it to the islands. (Environmental Protection Agency representative, Male, the Maldives)
However, the amount of garbage produced by the communities has also grown exponentially in recent decades, and there is still no proper system to manage this waste.

4.2 Relative positions of conflicting actors
The analysis identifies four categories of conflicts: intrapersonal, intragroup, horizontal intergroup and vertical intergroup. It follows the Rahim and Bonoma (1979) typology presented earlier, with the addition of horizontal and vertical intergroup categories, depending on administrative hierarchy of the actors involved.

4.2.1 Intrapersonal conflict. The analysis identified intrapersonal conflicts emerging from the adaptation decisions of community members in the Maldives and Nepal. In the Maldives concerns over the use of floodlights for fishing at night, contradicted their awareness of its unsustainability. The participants confessed that it was harmful for plankton and baby baitfish:

Earlier we used to go fishing in the nearby islands and had small boats and came back at night. Now we have big boats and use fish to catch bait. (Male, fisherman, 57, Kudafari, the Maldives)

In Nepal’s case, the concern relates to the use of fertile lands to build tourist lodge, and the awareness of risks posed due to external economic shocks and rapid onset hazards. These practices represent an intrapersonal conflict, where knowledge and awareness contradict practice.

4.2.2 Intragroup conflict. The interviews reflected an intragroup conflict within the community itself regarding resource use. An example is the norm conflict (discussed above) among Sherpas in Nepal, where livelihood aspirations and maintaining traditional customs relating to resource use collide. Another example comes from Khumjung, where the current Nawa complained about how community members disregarded his status, with the decline of Nawa system vis-a-vis the parallel Buffer Zone Committee of the Sagarmatha National Park. This was reported to be a principal reason for the lack of enforcement of fines, which had not been the case earlier:

People do whatever they feel like, they say I will do it, what are we going to do about it […] If this continues the Nawa system will not last long. (Male, Nawa head, Khumjung, Nepal)

In the Maldivian case, community members partially held fellow members responsible for the degrading environmental conditions. The reasons predominantly voice the changing attitudes of community members stated as increased “money mindedness” due to the proliferation of the market economy often at the expense of the environment:

In the Maldivian context, the people don’t really care about the environment. We might say that this project is bad for the environment, but it’s the government that decides. […] People wouldn’t care about birds, they don’t know. The island people want an airport. (Environmental Protection Agency representative, Malé, the Maldives)

4.2.3 Horizontal intergroup conflict. Horizontal conflicts between community members and non-natives are categorized as intergroup rather than intragroup due to “otherness” defined in terms of cultural affiliation with a place. This was clearly the case in Khumjung, where the Sherpas described the outgroup as people from the Oul or lower Solu areas, different to the Sherpas who considered themselves as mountain people. Most examples in the section describing attribution conflict involving in-groups and out-groups are examples of this level.

4.2.4 Vertical intergroup conflict. Conflicts between the government and community members are grouped as vertical intergroup conflicts. For example, in Khumjung, the conflict between the Nawa and the Sagarmatha National Committee, in which the latter was accused of usurping the role of Nawa. Other examples include breaking resource collection
rules post the 2015 earthquake with the connivance of the Sagarmatha National Park ranger, and issues regarding a lack of transparency and delay in receiving funds, narrated by a Buffer Zone Committee member and the Nair:

The government feels that the Sherpas get money and hence there is no need to send development funds, [...] there is no transparency at all, the meetings are held as and when they like. (Male, 59, Khumjung, Nepal)

This conflict has developed into a lack of trust in the government summarized in the quote above, and greater reliance on external assistance (particularly the Edmund Hillary Foundation). It is cemented by the fact that the schools, hospitals, electricity supply and even water are provided by international NGOs, notably the Himalayan Trust. Furthermore, post 2015 earthquake, the suggestion of building cement houses of the government hired were dismissed by Sherpas as financially unfeasible and disconnected with local realities.

In Inglæ, conflict arose between community members trying to secure livelihoods by resuscitating growth of their profitable cardamom and food crops, and the government for failing to offer solutions. Specifically, the Agriculture Department was held responsible for the promotion and sale of urea that was partially attributed as creating conditions for the pest attack and reduced soil fertility:

It used to be called government urea and was promoted as increasing agricultural productivity by the Agriculture Department [...] but at the same time we were not aware of its disadvantages. (Male, teacher, 32, Inglæ, Nepal)

In a similar case, the solution offered by the government to capture the wild boars destroying food crops was immediately rejected the community as dangerous and difficult. The problem had become so severe that people have stopped growing food crops or moved their place of residence, blaming the government for the situation.

4.3 Degree of manifestation of the conflict

The third, and final, dimension of conflicts concerns the degree of manifestation of the conflict. Here, the results do not support a clear-cut categorization of the data on its own. However, Pondy’s (1967) aforementioned description of the five stages helps to roughly indicate where on the ordinal scale between latent and manifest a particular conflict lies. Although it is often difficult to determine exactly which stage to assign a particular conflict to at any given time, the examples below serve as a guideline.

Examples of latent conflicts include previous described ends conflict between contradictory policies concerning FAD in the Maldives, and the conflict among Sherpas in Nepal, focused on modern and traditional norms. An example of a perceived conflict is the lack of congruence between the actions of the Environmental Protection Agency and the Ministry of Environment in the Maldives concerning environmental protection, best described by one participant:

If the Environment Minister wants to, the rules can be foregone, and there is no need for an environment impact assessment. (Environmental Protection representative, Male, the Maldives)

Examples of felt conflicts are the various goal conflicts concerning coastal protection in the Maldives, where technical measures have had environmental impacts (ends conflict), or increased coastal erosion in other locations (means conflict), and the conflict between the traditional Sherpa and modern governmental (Buffer Zone Committee) institutions for natural resource management in Khumjung. Several manifest conflicts have been described, notably the tearing down of the fences around the bikini beach in Maafushi, and local authorities taking resort owners to court. However, the manifestation of a conflict only requires action per se, not necessarily action directed toward another actor. Thus, the
conflict over the wild boar problem in Ingla, Nepal is a manifest conflict, as many community members, despite repeatedly voicing the problem to the authorities, eventually had to move, or stop growing food crops.

5. Discussion
The examples from the results indicate that adaptation to reduce risks is not a politically neutral process devoid of conflicts, as it involves actors with differing values, norms and goals, and characterized by power asymmetries between them. The results of the study suggest that the conventional binary categorization of conflicts – as either related to goals, objectives, and interests, or to emotions, interpersonal relations, and relationships (see Coser, 1956; Pelled, 1996) – may mask important distinctions. Although conflicts between contradictory or incompatible goals are common in the data (conventionally referred to as goal conflicts) it is important to pay attention to other conflicts that are also related to goals; but relate more to efforts that undermine at least one actor’s potential to reach them. As illustrated in the example of conflicting end goals in the Maldives NAPA created largely by the use of FAD, but also how it indirectly undermines the means (used by local small fishermen) of earning livelihood. It is, therefore, important to differentiate between ends and means conflicts, which together constitute goals conflicts that in turn are a form of value conflict (Figure 3).

The conventional binary categorization of conflict is not only liable to mask important distinctions between different types of goal conflicts, but also between adaptation conflicts related to emotions and relationships. For example, the conflicts about partial nudity on tourist beaches and blaming resorts for littering beach in Maafushi cannot be explained as only goal conflicts. They are fundamentally different, with the former being primarily rooted in conflicting norms, and the latter primarily in cognitive biases.

Conflicts concerning customs, traditions, religion and culture, have deeper roots and reflect conflicting norms. Despite creation of Sagarmatha National Park in Khumjung, cultural norms continue to influence resource use (Stevens, 1993). Although a norm itself is the basis of goals and interests, the empirical findings suggest a crucial distinction between goal and norm conflicts given the greater complexity, emotional evocation and social mobilization of the latter.

When conflicts concern the explicit attribution of particular issues to other actors, the focus is no longer on goals or norms, but instead on “us” and “them.” Interesting to note is that blame is assigned to entire groups and not to the individuals (Meierotto, 2012). To make sense of a situation that is perceived to be deteriorating, complex causes are condensed by attributing the perceived problematic aspects to another actor. Some narratives also highlight conflicting norms, but play an auxiliary role in distinguishing between the ingroup and the outgroup, rather than being the main aspect of the conflict. Tajfel’s (1974) social identity theory provides an explanation for the psychological mechanisms underlying the attribution of blame. However, attribution conflicts – such as the waste problem in the Maldives and contamination of sacred sites in Nepal – are further complicated by another cognitive bias that compels people to ascribe their own behavior to situational constraints,
and the behavior of others to their abilities, personalities and intentions (Ross, 1977), which facilitates the assigning of blame.

The results also support established notions of the importance of the relative positions of actors involved in a conflict, and the degree of manifestation. This includes intra-individual goal and norm conflicts, which Rahim and Bonoma (1979) refer to as intrapersonal. No attribution conflicts are identified in this category as it requires at least two actors. Nonetheless, it demands attention as it points to adaptation decision shaped by social judgment of risk where people are willing to suffer harm to achieve other goals that they value (Renn, 2008). The results show all four types of conflicts between actors within a group, as well as between groups, which Rahim and Bonoma (1979) refer to as intragroup and intergroup. Obviously, the distinction depends entirely upon how the group is defined, and must be made explicit in any study of adaptation conflicts. While Sherpa (2014) emphasizes understanding social heterogeneity among Sherpas to identify differential impacts of climate change, here we go further and include the increasing number of non-Sherpa (Oul) people living in Sherpa villages. However, our study leaves this demarcation in the hands of interviewees.

The resulting taxonomy categorizes conflicts between individuals (or groups of individuals) within a community or organization as “intragroup” conflicts, while conflicts between communities, organizations, or communities and organizations are referred to as “intergroup” conflicts. This approach appears to be vitally important when studying conflicts in adaptation, as external observers can overlook fundamental divisions among people. For instance, the division between native and non-native people living in the mountainous communities in Nepal. The work of Fresque-Baxter and Armitage (2012) indicates similar conflicts between insiders and outsiders.

When conflicts occur between actors at that same administrative level, Rahim and Bonoma’s (1979) framework needs further elaboration. By definition, intrapersonal and intragroup conflicts involve actors at the same level. Intergroup conflicts, on the other hand, can involve actors at either the same or different levels, resulting in a markedly different distribution of power and conflict dynamics. Therefore, we argue that a distinction should be made between horizontal and vertical intergroup conflict, resulting in a final taxonomy of intrapersonal, intragroup, horizontal intergroup, and vertical intergroup conflicts.

Similarly, the results of the study identify the dynamics of the conflict in terms of its escalation and manifestation. This understanding is essential as a lack of visibility or violence does not mean that conflict is not present. Studying conflict in adaptation must, therefore, not only look for vocal protest or explicit action, but also listen to peoples’ concerns and look for contradictory narratives.

The three dimensions of conflicts in adaptation identified in this study combine to form a comprehensive theoretical framework. This is called the Adaptation Conflict Framework (ACF) and although it is grounded in the empirical findings presented here, it aims to facilitate the identification and analysis of conflicts in adaptation in general. It comprises a chart showing the 15 possible combinations of types of conflicts, the relative positions of actors and an estimation of the degree of manifestation (Table III). Its main value is to

<table>
<thead>
<tr>
<th>Type of conflict</th>
<th>Relative positions of actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ends conflict</td>
<td>Intrapersonal</td>
</tr>
<tr>
<td></td>
<td>Intragroup</td>
</tr>
<tr>
<td></td>
<td>Horizontal intergroup</td>
</tr>
<tr>
<td></td>
<td>Vertical intergroup</td>
</tr>
</tbody>
</table>

Table III. The adaptation conflict framework

<table>
<thead>
<tr>
<th>Degree of manifestation (1–5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribution conflict</td>
</tr>
<tr>
<td>Norm conflict</td>
</tr>
<tr>
<td>Means conflict</td>
</tr>
<tr>
<td>Ends conflict</td>
</tr>
</tbody>
</table>

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facilitate the identification and analysis of all of the actual conflicts in adaptation in a selected case. The first step is to use it as a worksheet to facilitate the broad identification of conflicts, and involved actors. The second step is to use it as a coding template when analyzing the conflicts that emerge from the narratives of participants, documents and other sources.

It is important to note that a pair of actors can have several simultaneous conflicts, and each can have simultaneous conflicts with other actors. Although it is difficult to ascertain in a study like this, it is likely that at least some of the conflicts that share a common actor are linked, as conflicts are well-known for constraining behavior (Schelling, 1963). The ACF stipulates that all of the identified conflicts in a particular case constitute a more-or-less complex system (Figure 4).

The empirical additions from this paper to established theory concern the four qualitatively different types of conflicts, and the distinction between horizontal and vertical intergroup conflicts. These additions are likely to be applicable in other contexts that remain to be studied – at least in other communities in Nepal and the Maldives, probably in South Asia, and perhaps even around the world. Only further research can tell.

6. Conclusion
The results of the study show that adaptation to reduce risk is a process involving conflicts of multidimensional and complex nature, which cannot be sufficiently captured by conventional binary categorizations of conflicts. In this study, the most basic link between adaptation and conflict arises from the premise that individual or collective actors with different power pursue disparate ends using different means. Both of which may change, and some of which are contradictory or incompatible. At the same time, more profound conflicts arise from opposing norms, which are likely to occur when adaptation extends different norms and pits development against tradition. Finally, unmet expectations and the overwhelming complexity of changes seem to cause conflicts where others are blamed for the situation. These four different types of conflict can be intrapersonal, intragroup, or between groups on the same or different levels. Moreover, they can range from latent and invisible, to manifest, and even violent. In attempting to understand or engage in adaptation to reduce risk – regardless if related to climate change or not, or if focused on rapid onset hazards or everyday risks – it is vital to grasp the complexity of both actual and potential conflicts. The ACF offers an important starting point to identify and analyze conflicts in adaptation along three key dimensions. Hence, facilitating a more nuanced understanding of the complexity in conflicts related to adaptation which is vital to guide meaningful efforts to resolve them.
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Further reading


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Using a Luhmannian perspective for earthquake resilience

Inventory of local associations in Düzce province

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Abstract

Purpose – The purpose of this paper is to interpret Luhmann's Social Systems Theory to discuss disaster resilience, and use its "functional method" for creating "local organizational inventories" to support the trend of integration in Turkey’s disaster management system. For this, the authors used a case study from Düzce province in 2013, investigating the organizational aftermath of two major earthquakes in 1999.

Design/methodology/approach – A purposive sample of local associations in city center of Düzce province was used. The local associations were selected according to the criteria if they organized any disaster-related activities after the 1999 earthquakes, despite being specialized in domains other than emergencies. Representatives of these organizations were interviewed about the content of their disaster-related activities and their organizational cooperation.

Findings – There was a lack of overlap between centralized emergency plans and local history of self-organized disaster activities. Both centralized and local organizations primarily engaged in activities that aim to reproduce their own systemic boundaries, rather than synchronizing central and local efforts in disaster planning.

Practical implications – The method used in this research helps discovering the local diversity of resources for improving resilience.

Originality/value – Arguing that disasters should be discussed under a theory of modern society, Robert A. Stallings refers to Luhmann's theoretical work (Stallings, 1998, p. 134). Complexity plays a central role in emergencies in modern society. Therefore, the Luhmannian perspective needs to be incorporated into disaster studies to account for increasing social complexity and systemic differentiation. The problems resulting from functional differentiation and the relationship between different problem–solution have their effects on emergency planning.

Keywords Luhmann, Disaster management, Planning, Local self-organization, Resilience

Paper type Research paper

Although Luhmann's Social Systems Theory (SST) received its share of criticism in 1970s and 1980s[1], it has been reinterpreted and adapted to variety of research topics including but not limited to education (Qvortrup, 2005), social work (Villadsen, 2008; Ahmed-Mohamed, 2011), methodological discussions (Lee, 2007; Mitchell, 2007; Ziemann, 2007; Cheng, 2009), health (Meyer et al., 2008; Ertong, 2011), organizational studies (Nassehi, 2005; Besio and Pronzini, 2011) and disaster resilience (Kaufmann, 2013). The aim of this paper is mainly to assert that fundamental concepts of the SST can be operationalized to measure, discuss and improve community disaster resilience. We try to exemplify what an SST-based local organizational resilience inventory can offer to the trend of reformation towards a truly “integrated” approach in official risk and disaster management system in Turkey. This is the reason why studying the organizational aftermath of two

The paper has been adapted from unpublished PhD thesis.
major earthquakes, which happened more than a decade ago by the time of this study, is meaningful.

Through a case study of 1999 earthquakes in Düzce-Turkey, this paper investigates the applied potential of the SST and its functional methodology by preparing an inventory of locally self-organized associations that engaged in various disaster activities by their own initiative. The SST concepts and the “functional method” helped us observe and discuss organizational relations between these small-scale local associations in Düzce and the local branch office of centralized Disaster and Emergency Management Authority (AFAD) in Turkey. As we observed in this study, the local associations can contribute significantly to diversification of local resources; therefore they are important in relation to four aspects of community resilience: self-organization (Birkmann et al., 2012), resource diversity, connectedness and civil society involvement (Longstaff et al., 2010).

**Theoretical frame: SST concepts and resilience**

In this section, we will first introduce relevant SST concepts like “system,” “environment,” “autopoiesis,” “functional differentiation,” “functional equivalents,” and “structural coupling”; and then we will continue with concepts and preconditions related to resilience, hoping to display theoretical similarities and potential connections in between.

In Luhmann’s theory of society, “the system of society is accordingly characterized, […] solely by the operation that produces and reproduces society: communication” (Luhmann, 2012, p. 35). The social “system” is basically the result of an “autopoietic” (self-producing/self-organizing!) distinction, between the “system” and the “environment,” both of which consist entirely of communication. There are three types of social systems; “interaction” produces itself on the basis of communications among people present; “organization” on the basis of decisions (as the organizational form of communication); and “society” is reproduced by the other types of social systems simultaneously as they reproduce themselves (Seidl and Becker, 2005, pp. 407-410). The “system” distinguishes itself from the environment by reducing the meaningless complexity of the environment through meaning of systemic “codes” within its boundaries. The system keeps applying these distinctions to itself, further differentiating its inner structure. In pre-modern societies “segmentary” or “stratified differentiation” were dominant, but in today’s modern society “functional differentiation” (of communication into various operationally closed function systems such as economy, politics, education, etc.) is dominant (Moeller, 2006, p. 220). “Structural coupling,” in the modern context, refers to how operationally closed function systems are still interacting with one another albeit at a significantly limited level (Moeller, 2006, p. 226). The difficulty created by the autopoietic character of all social systems leads to an ever-growing number of problems to be solved by the system in modern society. The system’s outer (environmental), and inner complexity and the problems they pose on the system are not to be solved in any one specific way. Various solutions of the same systemic problem can emerge during this process of continuous distinction and self-organization, creating “functional equivalents.”

Having seen that “autopoiesis” (self-organization) is an ontological feature creating the social systems in the very first place according to SST, we can now turn to resilience. Self-organization is an important capacity for a local population while coping with a disaster, and therefore it is one of the most important components of a multi-dimensional definition of resilience (Pugh and Potter, 2003; Folke, 2006; Parry et al., 2007; Pelling, 2010; Setiadi and Chang Seng, 2012; in Birkmann et al., 2012). Help from outside disaster area is limited both in duration and content. Especially in the long run, the local population is on their own for restoring the previous variety of social activities in daily life, and for protecting it against the next disaster incident as much as possible. A quick recovery would take a much wider local participation base, and it is the reason why Miller and Rivera (2011)
state that, “increasing the resiliency of a community can be done by recognizing the resources of organizations that are not a part of the traditional disaster plan.” The self-organized local associations we studied in Düzce were normally not recognized as a part of traditional disaster plans; but they still provided resource diversity in community resilience as we documented.

In order to distinguish local associations from the disaster-specialized organizations, which were already a part of the traditional disaster plan, we used a typology developed by Dynes at Disaster Research Center (DRC) as shown below in the list (Webb, 1999, p. 2). According to DRC typology, the organizations can be divided into four groups according to the organizational adaptations they manifest about disasters.

DRC typology for organizational adaptations (Dynes, 1970; Webb, 1999; Kreps and Bosworth, 2007):

- Type I: Established – They exist prior to an event and much of what they do is expected (e.g. hospitals, law enforcement and fire fighting units, public utilities, departments of public works, mass media, military units, etc.).
- Type II: Expanding – While much of what they do is expected as well, their core structures change from a small cadre of professional staff to a much larger unit of volunteers (e.g. local community emergency management agencies, Red Cross chapters, etc.).
- Type III: Extending – While they exist prior to an event, much of what they do is not predetermined (e.g. other governmental agencies, small businesses, larger firms, social clubs, public service organizations, religious organizations, etc.).
- Type IV: Emergent – Both their existence and activities are *ad hoc* and therefore unique to the event.

“Extending organizations” are not routinely active about disasters, but they make an organizational decision to take action, channeling their routine communications (in the form of decisions) into disaster domain. This study focused on “extending organizations,” which self-re-organized without any external/distant steering or previous guidance of disaster management policies and plans. Local associations provide valuable examples of local resource capacity with their relatively small and less institutionalized formation in this sense. Questions might be asked about why other organizations such as foundations were excluded in our study. The reason is that, local associations are established through the local population’s direct initiative and their decision-making process is not under the control of any headquarters located in a non-disaster stricken, distant area. Some of these local associations re-organize shortly after a disaster, not because of an external decree, order, directive or mandate of any distant headquarters but precisely because of their direct perception of local needs.

We considered the “established” and “expanding organizations” as elements already within the system of established disaster plan. Then we investigated if there were new organizational connections between these established actors and the “extending organizations” outside of the existing disaster plans. From the SST perspective, the centralized disaster plan can be taken as a social “system” (consisting mostly of established’ and “expanding organizations”), and the local associations in Düzce constitute “functional equivalents” located in the social “environment” of this system. Both AFAD’s established disaster plans and the self-organized local associational disaster activities are oriented toward solving the same problem of the disruption of social communication (i.e. disaster). These were taken as “functional equivalents” in our study, and they were investigated if their relationship produced advantages or limitations.

The “extending organizations” comprise an important point of discussion for the SST; because they provide a chance to observe self-organizing “functional equivalents” outside of
the centralized disaster plan. The relationship between alternative problem–solutions is indicator of the systemic potential for the formation of new relationships (“structural coupling”) between different social “systems,” producing new internal adaptation of the society to itself. In the case of disaster recovery, society practically adapts to its own complexity by re-organizing the routine communication flow of the society and establishing more resilient channels of communication. However, this process has its own built-in problem; systemic blindness.

We can talk about three important reasons to focus on “extending organizations.” First, the extending local associations are normally specialized on communication other than earthquakes and disasters, such as sportive or cultural goals. The associations we focused on in this study are the ones that decided to self-re-organize for resuming their routine function in a disaster context, contributing to restoration of routine. By investigating these connections between non-specialized local associations and the specialized (“functionally differentiated”) elements of the disaster management system through functional method of the SST, we can discover the incidents of systemic blind spots, and start a discussion on disaster management.

Second, the capacity to self-organize is one of the constitutive dimensions of a more integrated disaster response. We can say that the established, specialized (with narrow organizational horizons), centralized disaster plans cannot take care of everything on their own. The diversity of routine, daily social life requires a variety of activities to be restored after disruption, which AFAD could not carry out single-handedly.

Third, and at last, the “extending organizations” are also theoretically important for a better understanding and utilization of the SST and its “functional method” for disaster studies. Society is a social “system”; and it further (functionally) differentiates itself into many other systems. “Political system” makes and modifies urban policies (code: power/non-power), “legal system” produces laws about disasters (code: legal/illegal), “economy” comes up with ways to value and compensate for the financial losses (code: payment/non-payment), and so on; but all these systems are primarily concerned with their own self-reproduction using their own “codes” within their boundaries. These “systems” refer almost exclusively to their own previous systemic communication, and hardly anything else.

Since communication is the basic unit comprising the “society” and all “social systems,” without which no social action can ever be possible, it would be a meaningful pursuit to investigate how communication about earthquakes within different organizational boundaries relates to each other. The “functional method” suggests we investigate how these “functionally equivalent” solutions develop in various social systems, such as organizations, and how these various solutions relate to each other in complex ways.

SST’s concern with the social complexity also applies to discussions on resilience. The focus we placed on diversity and self-organization for local disaster resilience is also consistent with the “dynamic, discontinuously changing, complex, multi-stable, self-organizing, and adaptive” conception of resilience (Lorenz, 2013). Peregrine discusses the importance of local community’s existing social capital with all its diversity while formulating more corporately oriented political strategies for building local resilience (Peregrine, 2017). He suggests local encouragement of active citizen participation in emergency management and disaster planning for creating solutions that are “not available to the lone planner or planning committee” (Peregrine, 2017, p. 325). As we stated earlier, restoration of the previous variety of social activities in daily life after a disaster cannot be achieved only through centralized and disaster-specialized agencies such as the police, fire brigades and search and rescue organizations. That was precisely why the “extending” organizations were in focus of our study.

In the introduction, we stated that the key dimensions of resilience involved self-organization, resource diversity, connectedness and civil society involvement
We already elaborated on the conceptual importance of self-organization and resource diversity for resilience and SST. The interpersonal and group connectedness in a local community also contribute to resilience by enabling the diffusion of innovative learning throughout that community (Longstaff et al., 2010). Since we are dealing with a disruption of social communication (i.e. disaster), any opportunities to increase connectivity in local population is worth investigating. The civil society would bring diversity and redundancy of the community into centralized disaster management (Longstaff et al., 2010). According to Longstaff et al. (2010, p. 13), non-governmental organizations, such as associations, “are often key players in recovery from a sudden disruption such as a natural disaster.”

The 1999 Marmara earthquakes

On August 17th, 1999, a Mw 7.4 earthquake hit the north-western Marmara region of Turkey, affecting very densely populated and industrialized cities and towns like Sakarya-Adapazari and Kocaeli-Gölçük. The official numbers reported 17,479 casualties, and 43,953 injured (Özmen, 2000a). The total population affected by this earthquake was 15,816,476 according to Özmen’s report.

Just three months later, on November 12th 1999, Düzce was the epicenter of another earthquake of Mw 7.2. Almost half of the housing units in Düzce sustained some level of damage. This time, 463 of the total 763 casualties were in Düzce city center (Özmen, 2000b). It was a double disaster for Düzce. With the second destructive earthquake, the already existing disaster context was exacerbated and the already overstressed local capacities were challenged even further with more problems to solve. In order to speed up its recovery, Düzce was declared a province separate from Bolu in December 9th 1999. The population of Düzce city center had already been constantly increasing before 1999, and the upward trend only accelerated after 2000, despite the fact that it sustained more than half of total casualties in Düzce province. The change in Düzce’s provincial status aimed for speedy economic growth, but it also foreshadowed population growth, followed by a poorly planned and constructed urban center, to produce even further disaster risks in coming years.

From the SST perspective, the rising population also could mean more potential for communication. For the society as a social system, this could mean both a challenge and an opportunity. It was a challenge because there would be more communicative material to differentiate, and more to be interrupted (and restored) the next time a disaster strikes. It was an opportunity because it meant a larger toolbox and more contributors to build local earthquake resilience. This opportunity, however, requires a creative re-interpretation of the SST’s “functional method” in order to discover “functional equivalents” of AFAD in Düzce.

Methodology

While using the “functional method,” first we operationalized the “system” as the Disaster and Emergency Management Authority in Turkey (AFAD) and its centrally prepared plans for disaster risk reduction, preparedness, disaster recovery and reconstruction. We operationalized “extending” local associations in Düzce as the “environment,” containing “functionally equivalent” solutions, since AFAD’s activity about disasters in general is not the one and only solution. We tried to make an inventory of these associations and meanwhile investigate and understand the relationship between these “functional equivalents” after the 1999 earthquakes.

AFAD was founded in 2009, 10 years after these major earthquakes and 3 years before the completion of this study, as a more comprehensive replacement for the general directorate of civilian defense, the general directorate of disaster affairs and the general directorate of Turkish emergency management. The local associations were asked for “any” cooperation with official organizations active back in 1999 as well as the currently active
ones at the time of this study, and they did not report any significant organizational cooperation neither with the past directorates, nor with AFAD.

AFAD claims a more holistic and comprehensive organizational vision, and a shift from “emergency and crisis management” to “risk management” and “Integrated Disaster Management System” (AFAD, website, “About Us”). This claim seems to be in line with the Hyogo Framework for Action 2005–2015 (UN, 2005), and with the Sendai Framework for Disaster Risk Reduction 2015–2030, both of which emphasize community involvement and temporal continuity (UN, 2015, p. 5). This is precisely why scrutiny is due on the state of disconnection between AFAD and local associations; and why this study indirectly aimed to problematize if AFAD operated in a truly integrating manner as it claimed.

There were three reasons why we focused on local associations; one methodological, one logistical and one theoretical. First, the methodological reason is that, associations have been the most common forms of social organizations in Turkey due to favorable and loose legal regulations (Erözden, 1998). By the year 2016, there were 109,480 active associations in Turkey with a member total of 10,759,160[2]. These numbers equal or in some cases surpass other social organizational forms such as political parties, unions and foundations.

Second, the logistical reason is that, earthquakes have primarily local impacts in the form of social disruption and disability, and the support coming from outside is available only for a limited period of time. The local population has to learn to rely on their own resources and initiative in the long run. The local associations can also be argued to provide the most room for local initiative when compared to a political party, foundation or union with headquarters in another province or even another country. We reckon, registering the local needs, deciding on local priorities and mobilizing a relevant diversity of resources in an organized manner is relatively more direct and immediate especially in local associations.

Finally, the theoretical reason is that, the discussion on local disaster resilience requires a much more immediate conceptual construction. Bruno Latour cited Tarde as an “associationist,” who could transcend the micro- and macro-distinction when interpreting the society. And he went on to add that the social scientists needed to start realizing and working with “the social as association” rather than with “society” as an abstract entity; and for this, an empiricist attitude is required in order to “follow what actors do” (Latour, 2004). Latour and Callon (2015) argued that micro and macro actors are constantly under construction, they constantly need to consolidate their networks (of things and humans) and therefore have ever-shifting sizes. For Latour, “actor-networks” simplify the social world into “black boxes” (taken for granted connections and resources) and for Luhmann “systems” reduce the complexity of the “environment” inside their boundaries.

Just like Latour argues that the actors always have the potential to undergo a change of sizes (because of their leaky black boxes) (Latour and Callon, 2015), for Luhmann, the elements of a social system have to be reproduced through events (i.e. recurring communication), which have no duration (Kaufmann, 2013, p. 65). There is no steering center (neither macro- nor micro-) for the modern society to direct it as a social system into intended outcomes (because of the highly differentiated, synchronously operating, and mutually blinded social systems) (Luhmann, 1997; Moeller, 2012). Therefore, in the case of disasters, “extending” local associations (not routinely specialized in disasters and emergencies) can have impacts on disaster management quite disproportional to their size.

The disruption caused by the earthquake is a very contextual and local phenomenon, and this problem has to be resolved at the very locality where it took place. The local associations, despite being limited in scale, contain an already existing self-organizing initiative, and they unknowingly play crucial roles in restoring the diversity of local communication after an earthquake. In other words, these local organizations can have asymmetric contributions to disaster management system, even though the established system has a selective bias over them (by allocation or blockage of resources, forming or
denying partnerships, etc.). These local associations can provide the building blocks of a more resilient society by definition since they are self-organized (and self-re-organized after the earthquake), diversified, locally connected and non-governmental. Local capacities and already existing social networks are known to constitute a vital part of disaster resilience, helping the affected local population function, and enable them to cope with immediate and longer-term needs after a disaster in urban context (Rey et al., 2017). This aspect of the local associations provides us with the theoretical consistency to conceptualize the society as association, which requires a constant reproduction at a very concrete level. In a similar manner, the proof of a truly effective disaster plan is in the successful application at the locality where disaster strikes. Similarly, the failure of a disaster plan could also mean a larger-than-local cascade effect in whole society.

Data collection
The field research started back in 2010, with a preliminary visit to Düze and interviews with some local associations. During our field visits we met and interviewed the representatives of some inactive or dissolved local associations as well as the active ones. Some interviewees had been active in the domain of local civil organizations (associations, cooperatives, clubs, etc.) and they had been members of more than one local organization in due course. The information they provided helped us shape our interview plans for the rest of the study.

In 2011, a list of all associations in Düze was requested from the governor’s office. We limited our focus to city center of Düze, where multi-storey urban construction was the most intense and the 1999 earthquakes caused the highest rate of destruction and casualties. Between October 2011 and March 2012, we did an initial telephone survey with 220 of the 280 local associations in city center. This was a preliminary assessment to see return rate and verify contact info on the list. In this telephone survey, we asked a single question; “Has your association ever organized, participated, or engaged in any sort of earthquake-related activities whatsoever?” A total of 78 out of 220 calls replied to our telephone calls. Out of 78 replies, 15 associations answered positive for any sort of earthquake-related activities. Not all of these associations agreed to take part in our study.

For the next step, we decided to survey the city center with field visits and face-to-face interviews. This enabled us to find and contact some other local associations in Düze city center, not listed by the governor’s office, not responding to our phone calls, and not mentioned by our preliminary interviewees. Finally, between September and December of 2013 we had 27 in-depth interviews in Düze city center with the representatives of all four types of organizations in DRC typology, with an emphasis on “extending” local associations (15 interviews). In these interviews, our questions covered the routine and disaster period activities of the organization, the problems they faced, and their organizational partnerships in this process. All of the local associations mentioned in this study were active ones by the time.

Findings and discussion
Generally, both AFAD and the local associations tended to engage primarily in communication, cooperation and activities that contributed to maintenance of their own organizational boundaries. As the SST predicted, even though these associations contributed to recovery, they considered themselves not as a part of the disaster management system; but instead, as parts of various religious, sportive, administrative or cultural systems in accordance with their routine domains. Their communications, organizational partnerships and activities remained within functionally differentiated boundaries. This paper covers three outstanding examples out of the 15 total cases in Düze city center.
The first was the relationship between AFAD and Düzce Association of Amateur Radio Enthusiasts (DUZRAD). DUZRAD should not to be mistaken for a local branch office of Turkish Radio Amateurs Club (TRAC). It was an independent local association founded on October 27th 2009 with its own board of management and its own charter. At the time of 1999 earthquakes, when the telephone lines were down, the radio amateurs with their own national and international webs of radio communication, including TRAC back then, provided assistance to civil defense and search & rescue teams in the disaster area in Düzce and adjacent provinces. Having been founded in 2009 as an independent local association, DUZRAD installed an independent, off-the-grid radio relay station in 2011 entirely by its own local resources in Kardüz Plateau in Düzce province, at an altitude of 1,830 meters above the sea level. This amateur relay station covered a total of 16 provinces adjacent to and near Düzce. Even if a possible earthquake in Düzce region or in Istanbul brought down the main communications and power infrastructure, this independent relay station would remain operational. With this reason, the AFAD Düzce office signed a local memorandum of understanding, separate from TRAC, with DUZRAD, making it a part of the established plan.

However, the DUZRAD had to purchase all of the technical equipment by its own financial resources. It had to pay the rent for the location, just like a commercial communication company, and the members actually considered this to be unfair. DUZRAD set the station up entirely by its own technical knowledge and expertise, obtained all the required official permissions from the Ministry of Forestry, and paid for the land plot rent by its own local resources. Neither AFAD nor any other organizations made any contributions in this process. This meant AFAD benefited from DUZRAD’s resources to maintain and improve its own organizational boundaries, but did not help or mediate DUZRAD solve its problems with other functionally differentiated “systems” such as financial or legal system.

Installing and maintaining such an independent, off-the-grid relay station at such a hardly accessible geographical location is an indicator of the strategic importance of maintaining the flow of communication for this local, self-organized association. AFAD used this local resource to back up its own capacity to maintain communications in an emergency. While doing this, AFAD kept its organizational horizon down to its own specialized domain (disaster management) and professional duty. DUZRAD had extended its domain of activity from radio enthusiasm to emergency operations, taking more responsibility and new social functions but not received a corresponding organizational support from AFAD to start or maintain this new function. This is also a theoretically critical connection to SST, according to which communication is the building block of any “social system,” and DUZRAD took initiative to secure its continuity in a disaster context, therefore concretely contributing to local resilience.

The manager of DUZRAD was in managerial position in another local association as well; Düzce Association of the Physically Disabled. Even though the interviewee was in a managerial position in both of these local associations, the Düzce Association of the Physically Disabled had no organizational connections or cooperation with AFAD. These two organizations did not take place within each other’s definition of organizational environment and no channels of communication were established between these two.

The second particularly interesting case was the Albayrak Association of Youth and Sports, running a local gym, a karate dojo and an arm-wrestling club in Düzce city center. The association had had 350 members in its last congress by then (year 2013), approximately half of these being women. This association had been re-activated within the first month after the August earthquake in 1999 to offer sports courses for free to the young university candidates preparing for physical education department at the time. Later, the candidates (approximately 15 to 20 young people) who participated in their free courses
succeeded in their physical exams and they were placed in the universities near Düzce. In the months to follow, this association also formed a simple sports center in Beyciler tent-city on the request of the tent-city dwellers. The association managers contacted the administration and requested a tent where simple sports activities such as step and aerobic sessions along with karate classes could be held for the earthquake victims free of charge. Until this tent-city was removed, the sport center was active for four months in an allocated tent, offering all members of Beyciler tent-city sportive recreation free of charge. There was not such a space provided in the prefabricated temporary housing area for sports, so they remained inactive for a period of approximately eight months.

One year after the earthquakes, they re-furnished their sports center in Düzce city center. In this commercial gym and dojo, they accepted people who suffered physically debilitating earthquake traumas for rehabilitative sports assistance free of charge. Some victims suffering light traumas, weak tendons, contusions, muscle atrophy and muscle dysfunction reportedly recovered with regular gym attendance. They also arranged a number of local karate competitions, in which children and young people suffering from physical earthquake traumas and disabilities were registered for competition free of charge. Meanwhile, they contacted the National Olympics Committee for sports equipment assistance. The association received sports equipment and distributed these to their young karate students free of charge. Here, in terms of organizational cooperation, although they fulfilled very important functions in disaster recovery of the local population, they cited not AFAD (or its predecessors), but the National Olympics Committee as their organizational partner. During our interviews with AFAD Düzce office, this local sports association had still not been cited as an organizational partner either. This was an excellent example of a systemic blind spot if we wanted to discuss improvements to the disaster management system in Turkey. This local sports association reduced its organizational horizons and partnerships to domain of sports, and AFAD reduced its organizational horizon and partnerships to domain of emergency operations and disaster management. Thus, even though these two organizations’ activities overlap in their functions, they were very strictly blind to one another in systemic terms.

The third interesting case was the Merkez Büyük Mosque Construction and Maintenance Association. This small-sized historical mosque had been built in 1912 as the central mosque of Düzce in its time, and it had been damaged in the August 17th earthquake, and it almost totally collapsed on November 12th 1999. After the first earthquake, a hut was built in the yard of the mosque and the services were carried out in this hut. The association undertook the reconstruction of this historical mosque after its collapse. During the reconstruction of this mosque, a strong disagreement surfaced with the general directorate of foundations on how this historical building was to be reconstructed. After the second earthquake, the remaining debris of the old mosque was removed by the association’s initiative in order to make room for construction of a new mosque on the same spot. However, this was a serious problem for the general directorate of foundations since this was a historical building and originally the property of the directorate. For the directorate, keeping the historical authenticity of the building was priority, and they pressed for using the stone blocks from the debris of the old collapsed building in the construction of the new one, with the previous architectural features. However, the mosque association disagreed with strict historical preservation, arguing that the safety of the building was of a bigger concern in the case of another major earthquake. The association aimed at putting the mosque back into function in the shortest time possible to deliver religious services with least disruption, and do this with earthquake safety. The manager of the association stated that from what they observed after the 1999 earthquakes, it was a mistake to construct large Ottoman style mosques with high dome-ceilings and high minarets in an earthquake zone. The best solution would be to construct small Seljuk style mosques with flat ceilings. The disagreement was so deep that it was taken to the court, since the “legal system’s
function is to regulate conflicts when they are brought up (i.e. ‘thematized’) properly within
the medium of jurisdiction, formulated in its ‘systemic codes.’” The manager of the
association had been sued in the high criminal court for violation of restoration principles in
reconstruction. However, the case was resolved in the end, long after the construction of the
new mosque building had been completed by the association. The association manager
reported that the new building had been constructed according to the most recent
construction codes, with much better seismic resistance.

The local association was concerned with the functionality and safety of the mosque after
the earthquakes, and they aimed to construct a new building after the old one had collapsed.
However, the general directorate of foundations was primarily concerned with the historical
authenticity of the building; and thus interfered, albeit unintentionally, with the local efforts of
recovery. In this particular situation, the systemic blindness not only stole from organizational
cooperation, but it actually impaired the local efforts of recovery and reconstruction by
leading to a strong organizational conflict. Once again, AFAD (or its predecessors) was not
cited as a stakeholder, organizational partner or mediator in this process. The problem was
“thematized” mainly within the legal “system,” through laws of ownership, rather than as a
part of disaster management system. The situation posed an example of differentiated and
mutually blinded “systemic boundaries” hindering the functioning of “social system.” This is
precisely why society needs to adapt to its very own increasing internal complexity, more than
it needs to adapt to its environment.

Conclusion
The power of SST lies in its ability to explain why the centralized and local organizations in
the very same city (as in Düzce) did not cooperate despite having similar functions and
purposes in their activities due to systemic blindness. The “functional method” can help the
researcher and the policy-maker detect the local potential of self-organization, which was cited
as one of the fundamental tenets of community disaster resilience by Birkmann et al. (2012).

In the case of Düzce, our functional approach and the attempt for a local inventory
unearthed the previously unnoticed local potential for disaster management plans. Field
observations showed us that the central agencies failed to notice relevant local associations,
and these relevant local associations failed to contact central agencies in terms of disaster-
related activities and organizational partnership. As a result, very potent local resources of
disaster resilience remain untouched in disaster planning.

The wide variety of activities offered by these local associations provide a diversity of
resources needed to restore the reassuring details of the routine daily life after disaster. This
diversity is made possible by the local civil society, which Longstaff et al. (2010) call a
subsystem of society. The ongoing lack of organizational connection between AFAD and
the local associations in Düzce, and also the one between the local associations themselves
could be interpreted as an indication of low interpersonal and group connectedness, which
hampered the effective utilization of these resources for disaster planning.

A more effective use of these local social resources for improving local community
resilience requires establishing channels of communication (“structural coupling”) among
these organizational systems. Even though we cannot steer the evolution of the society, SST
suggests we look for the alternatives. For disaster planning and management efforts, this
methodological advantage can be operationalized as “local organizational inventories.”
Once noticed, these dispersed local resources could be connected to the right local
organizational networks, and form resilience-oriented local organizational partnerships.
As a conclusion to the discussion of systemic blindness impeding local community disaster
resilience, we propose an active periodic survey and inventory of the “extending” local
organizations by every local AFAD branch office in Turkey, and inclusion of these local
inventories in national and local disaster plans for a more resilient local community.
Notes

1. Luhmann proposed an evolutionary, “autopoietic” (self-producing) conception of society (as an autonomously evolving system) whereas Habermas’ conception of society was based on the actions and rational consensus of actual individuals/subjects (Moeller, 2006). This dehumanized, autonomous conception of society by Luhmann was in stark contrast with the Habermasian mission of the completion of enlightenment (Moeller, 2006). In 1971, Luhmann and Habermas published a joint work focusing on this debate; Theory of Society or Social Technology: What does Systems Research Accomplish? (Theorie der Gesellschaft oder Sozialeotechnik: Was leistet die Systemforschung?). Moeller summarizes the social context and course of this debate:

   The intellectual climate in Germany was heavily influenced by the leftist “revolt” of the late 1960s, and Luhmann, who was not discernibly leftist or “progressive”, was branded with a depreciative title: “conservative”. [...] Habermas had a Marxist background and argued for social change, for emancipation, and for a better society, while Luhmann took, from the beginning, a rather disengaged stance. (Moeller, 2006)


References


Further reading


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Challenges of disaster training: implication for federal and state university libraries in Nigeria

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Abstract

Purpose – The purpose of this paper is to identify the challenges affecting disaster training in federal and state university libraries in Southwest Nigeria with a view to finding ways of overcoming them.
Design/methodology/approach – Having adopted the descriptive research design, 14 university libraries (seven each of federal and state) were selected from the Southwest geo-political zone of Nigeria. The total enumeration sampling technique was employed. Questionnaire and interview methods were used for data collection. The three research questions that guided the study were analyzed using descriptive statistics such as mean, standard deviation and ranking. Judgments were drawn using real limit of numbers and 2.50 as criterion mean.
Findings – Results emanated from the study showed that university libraries in the studied region are more equipped to fight fire disaster than any other emergency which is why fire drills and exercises are the prevailing disaster training received by library staff. It was also found that inadequate disaster facilities and equipment as well as poor funding were the greatest challenges confronting disaster training. The provision of adequate disaster facilities and equipment with the constitution of disaster prevention and response team was found as the most potent strategy for addressing the identified challenges.
Originality/value – The study lends strong empirical evidence for the underlining factors affecting disaster training in federal and state university libraries as well as academic libraries in general. The strategies for addressing the identified challenges are of more significance.

Keywords Nigeria, University libraries, Disaster management, Disaster training challenges, Disaster training programmes, Federal and state university libraries, Disaster training

Paper type Research paper

1. Introduction

Disaster, irrespective of type (e.g. fire, flood, water, theft and loss of data), is detrimental to libraries due to the material composition of the resources housed in them. Thus, the vulnerability of library resources automatically means same for the library and its existence. One of the major reasons for the existence of university libraries is the general management of information resources with a view to facilitating learning, teaching and research. Again, whatever interferes or prevents the library from accomplishing this task can be termed a disaster. Therefore, any incident that threatens human safety and damages, or threatens to damage a library building, collections, contents, facilities, or services is a disaster (Ahenkora-Marlo and Borteye, 2010) and could have a serious financial implication and also cause disruption of services (Rehman, 2014). It is therefore essential for libraries to guard against any threat, through adequate preparation to curtail the damage and loss of facilities and resources.

Crucial to this preparation is the incorporation of disaster management training into the preparedness process (Khalid and Dol, 2015). Ensuring capacity building among personnel
through various disaster training and re-training programs takes precedence in forestalling emergencies in the library. Succinctly, checkmating disasters require the training of library personnel to be able to handle disaster equipment, communicate timely and effectively, evacuate resources and carry out the contents of disaster plans. When this is achieved, the library is better positioned to prevent and, where it appears impossible, respond adequately to disasters (Ilo et al., 2018). The benefits of disaster training include but not limited to, increase in the creation of disaster awareness, familiarity with the disaster plan (where there is one), harmony among the disaster team, proficiency in handling of print and digital materials, skills on ways to rescue lives trapped in the library, salvaging affected resources and evacuation of damaged materials.

By implication, libraries who train their staff on handling disaster stand the chance of safeguarding lives and library materials whenever disaster strikes better than those who do not. This is because training provides the mechanism for operationalizing emergency preparedness organization and planning (Gibson and Pupulidy, 2015). It is pertinent to note that disaster training and its actualization is met with different challenges in university libraries, especially in developing countries. These challenges result in delays and the inability of the members of staff to act swiftly when there is a need for emergency actions. There is a failure in education and training about the value of measures required to handle a disaster (Aziagba and Edet, 2008). The availability or lack of opportunity for staff education and training in preparing and managing disaster determines the extent of damages recorded or success made when a disaster occurs.

Due to its importance in the overall success of disaster management, disaster training has continued to receive attention among library scholars and researchers with mix findings emerging. For example, Matthews and Eden (1996) examined disaster management training in libraries; Rattan (2013) investigated the training exercise/instruction for library staff in India; Abareh (2014) considered the availability of structured training programs toward disaster preparedness among library personnel in Northeast, Nigeria; and Khalid and Dol (2015) highlighted the role of staff training and participation in disaster and Emergency Response Team in academic libraries in Malaysia. Besides Matthews and Eden (1996), these studies only considered training as one of the objectives in the different studies. However, the focus of the current study is to examine the challenges of disaster training programs and their impacts on federal and state university libraries in Southwest Nigeria.

1.1 Objectives

(1) highlight disaster training programs available in federal and state university libraries;
(2) identify factors militating against disaster training programs among federal and state university libraries; and
(3) determine appropriate strategies for addressing the identified challenges toward disaster training programs among federal and state university libraries.

1.2 Research questions

RQ1. What disaster training programs are available in federal and state university libraries?
RQ2. What are the challenges affecting disaster training programs in federal and state university libraries?
RQ3. What are the appropriate strategies for ameliorating the problems hindering disaster training programs in federal and state university libraries?
2. Literature review

2.1 The concept of disaster training in libraries

The management of disaster is a costly and daunting venture if adequate preparedness measures are not put in place. The view that disaster is a crisis causing widespread damage which far exceeds the ability to recover further buttressed this claim. Lives and properties of incalculable estimation have been lost globally as a result of disaster occurrences. Through effective disaster management practice, libraries and other organizations have been able to minimize exigencies that would have otherwise resulted in a significant or total loss of lives and properties. The role of disaster training in this regard helps to build and develop some forms of resistance capabilities in the case of emergencies. Essentially, coordination and training programs facilitate disaster responses, recovery and continuity (Robertson, 2015). Thus, the level to which a library responds or recovers from a disaster is proportionate to the level of training programs imbibed and preparedness measurements put in place.

From the antecedents of library disasters in Nigeria, training programs appear to be taken with little or no seriousness. Two campus libraries of The University of Jos have experienced fire disasters in 2013 and 2016, respectively. Evidently, if precautionary measures were taken after the first incident occurred, the second would have been prevented because in both disasters, a significant destruction of information resources and infrastructures was recorded. Nwokedi et al. (2017) who conducted a study to ascertain the disaster management and preparedness level of the university revealed that 98 (94.22 percent) of their respondents are of the view that the lack of staff training is the bane of absence of skills needed to effectively use fire extinguishers. Also, the research carried out by Ahenkorah-Marfo and Borteye (2010) revealed that more than half of the respondents said that their library was not prepared to prevent, fight or manage disasters. As a result, the authors conclude that more than half of the respondents in these libraries will not be able to handle disaster effectively due to the lack of skills. Many university libraries have lost valuable resources as a result of lack of skills and capacities required to salvage library resources during emergencies.

Through a disaster management plan, authorities are committed to the procurement and maintenance of facilities and equipment, training and testing of procedures which, in turn, commit staff to take responsibility of the prevention, response and recovery process (Muir and Shenton, 2002). Lack of skills among staff members heightens organizations’ vulnerabilities. Therefore, it is important to ensure that the staff have the mastery of required skills to handle disaster as well those required to salvage resources that have been exposed to minor damage. Aziagba and Edet (2008) noted that there is a failure in national and international education about the value of preventive measures and preparedness. The availability or lack of opportunity for staff education and training in preparing and managing disaster depends to a large extent on how the Library Management perceives the need for training.

The level of sensitization of disaster awareness has not been encouraging among librarians (Abareh, 2014). The author noted further that a majority of library staff are not informed at all. By implication, this lack of awareness means ignorance of the existence of threats to library buildings, persons and resources. When librarians are lukewarm about disaster preparedness, support for staff training will be greatly affected. Thus, Schneid and Collins (2001) emphasized the need for library managers to ensure that the in-house system safety professionals receive enough education on how to carry out activities geared toward making disaster management effective. A possible way to achieve this is through professional networking. Nikiko (2014) maintained that there is a need to network and learn from the experiences of other institutions so that library disaster practices can be benchmarked and experiences can be shared in different areas of librarianship ranging from the use of ICT to the management of disasters. Librarians who need to succeed in managing their resources adequately in the face of disasters must first of all ensure that they are not working in isolation. They must be ready to compare
processes, facilities, infrastructure, practices and policies. Absence of standards and poor exposure to the best international practices definitely act as limiting factors in disaster training of most local libraries.

2.2 Importance of disaster training programs in libraries

Many university libraries have had experiences of damaged infrastructures and resources as a result of lack of skills required to effectively utilize available equipment to salvage them. The necessary skills for prevention, mitigation and restoration of activities before, during and after disaster depend greatly on the efficiency of disaster training received by staff. Since training prepares staff with skills relative to what to do prior, during and after emergency, safety procedures, staff responsibility, reactions and recovery strategies should be given adequate consideration when planning disaster training programs (Mathews and Eden, 2009). Similarly, components such as the identification of appropriate equipment to fight or prevent fire and other emergencies, extricate and evacuate resources, notify concerned agencies through radio, telephone, mobilize and deploy activities, e.g., search and casualty management, rescue, etc., (Gibson and Pupulidy, 2015) are essential. Since staff performance per time depends on the level of training available to them, the acquisition of basic skills is therefore required to respond adequately or reasonably in times of emergency.

Library staff should not only be trained on how to handle general disasters in the library but should also be educated on specific skills required to combat disasters as they relate specifically to library resources. As Hasenay and Kritalic (2010) posited, the first step toward routine training and sensitization on safety includes the creation of awareness and education regarding the importance of disaster management issues required for the efficient and sustainable preservation of library resources. Coppola (2011) observed that disaster response officials are more effective if they are trained to do their job. The author enumerated some specialized disaster trainings that could be beneficial to libraries and their personnel as:

- evacuations;
- flood-fighting operations;
- coordination of warning;
- crowd control; and
- response to terrorist attacks.

Apart from general training required for handling disasters, library resources require specific attention. Staff cannot handle them during emergencies unless they are trained to do so. The importance of training cuts across all the elements in the disaster management cycle: mitigation, preparedness, response and recovery (Dimersar Academy, 2010). In other words, the extent to which individuals are trained reflects the proficiency displayed at every stage of the cycle in the event of emergency. Adinku (2003) emphasized on the need for academic libraries to hold regular compulsory staff trainings since this will help them know what to do when an emergency occurs. A library that has a disaster team, good disaster plan and equipment but has not trained its staff on how to maximize their use has failed in preparing for or managing disaster. Training as an aspect of disaster management should be such that it will equip the staff and help them understand what to do during different stages of disaster. Skills acquired from training will enable staff to handle equipment such as fire extinguishers, water hose, dust extractors, etc. Updating of anti-virus software, backup and recovery issues all require specialized education and training. The ability of individuals to effectively engage in various disaster preparedness activities is dependent on the level of training acquired (Sutton and Tierney, 2006). Effective management of disaster can only be achieved when adequate training and drill exercises have been provided (Deen, 2015).
Kidd (2005) observed that the National Trust and Historic Scotland have their own arrangement for preparing for disasters. They offer information and guidance on various aspects of conservation and related issues. Earlier, Alegbeleye (1993) suggested that African countries should have a national fire research institute which will be responsible for giving specialized training to the citizens, including librarians on methods of handling specific disasters like fire. Since fire is one of the major disasters that attack libraries, training should include fire drills and demonstration of the use of fire extinguishers, water hoses, use of fumigation chemicals, etc. In conducting these drills, particular attentions should be paid to the handling of library resources because of their vulnerability to disaster.

The Mangaung (2017) Metropolitan Municipality Disaster Management Plan stated that it is the prerogative of the disaster management unit of a community or an establishment to ensure the building and promotion of capacity among members and extending disaster training and education programs to schools. Also, Nabutola (2012) emphasized that school curricula should be updated to include basic information on risks and family/community preparedness practices. These assertions suggest the need to instill disaster preparedness and management consciousness among individuals from their school days. Consistently, The Office of the Auditor General (2003) affirmed that having identified the training needs peculiar to an organization, management should demonstrate its commitment to investing in staff by preparing a plan for implementing training.

3. Methodology

3.1 Procedure

The descriptive research design was adopted to enable the description of relationships without manipulation. The population of the study comprised of 327 library personnel drawn across 14 federal and state university libraries in Southwest Nigeria using the sample random sampling method. Since the population was manageable, the total enumeration technique was employed. Table I provides the federal and state universities libraries that provided the data for the study.

3.2 Data collection instruments

Questionnaire and interview methods were employed for data collection. The questionnaire was structured into four sections (A–D). Section A was meant to capture participants’ demographic profile. Section B was for collecting data on the disaster training programs available in federal and state university libraries. Section C was designed to elicit information on the problems militating against disaster training programs, while section D was structured to harness information on strategies for ameliorating the problems. All items were measured along a four-point scale of Strongly Agree (SA), Agree (A), Disagree (D) and

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Federal University of Technology Akure</th>
<th>FUTA</th>
<th>Olabisi Onabanjo University</th>
<th>OOU</th>
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<td>Tai Solarin University of Education</td>
<td>TASUED</td>
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<td>OAU</td>
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</tr>
<tr>
<td>3</td>
<td>University of Ibadan</td>
<td>UI</td>
<td>Osun State University</td>
<td>OSU</td>
</tr>
<tr>
<td>4</td>
<td>University of Lagos</td>
<td>UNILAG</td>
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<td>LASU</td>
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<td>FUOYE</td>
<td>Ekiti State University</td>
<td>EKSU</td>
</tr>
<tr>
<td>6</td>
<td>National Open University of Nigeria</td>
<td>NOUN</td>
<td>Osun State University of Science and Technology</td>
<td>OSUSTECH</td>
</tr>
</tbody>
</table>

Table I.
Distribution of responding libraries by ownership type
Strongly Disagree (SD). Also, interview was conducted to complement the questionnaire. The interview was guided using a self-structured interview guide. It was divided into the three main sections corresponding to sections B–D indicated in the questionnaire. It contained 15 items (i.e. five for each section). The university librarians (ULs), who are both the technical and administrative heads of the 14 university libraries studied, were the focus group. Out of the 355 questionnaires administered, 327 questionnaires were valid, representing a response rate of 92 percent which is relatively high.

3.3 Data analysis and reliability coefficients

Of the three research questions formulated to guide the study, real limit of number was used to take decision on research questions 1 and 2, while criterion mean of 2.50 was adopted for research question 3. Having pre-tested the questionnaire for internal consistency, the variables showed individual reliability coefficients of: disaster training programs 0.81; challenges affecting disaster training programs 0.83; and 0.94 for possible strategies for enhancing disaster training programs. The Statistical Package for the Social Sciences was utilized for data analysis.

4. Results

RQ1. What disaster training programs are available in federal and state university libraries?

Table II shows the mean ratings of the respondents on the types of disaster training programs provided for safeguarding libraries and their resources. Using the principle of real limit of numbers, the results of the data analysis revealed that the prevailing disaster training available to staff in the studied libraries is geared toward the proper handling of print resources (2.71). Ranked second in the distribution is training meant to prevent general disaster and training designed to enhance the communication of potential hazards and emergencies to appropriate quarters (2.53). With mean scores of 2.48 and 1.92 on the other extreme, analyses showed that training tilted toward the acquisition of special skills on handling of digital resources as well as flood-fighting drills and exercises is the least available.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Ownership</th>
<th>Overall</th>
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<tbody>
<tr>
<td></td>
<td>Federal</td>
<td>State</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td>Training on use of fire disaster equipment</td>
<td>2.69</td>
<td>1.02</td>
<td>2.95</td>
<td>0.94</td>
<td>2.78</td>
</tr>
<tr>
<td>2</td>
<td>Periodic fire drills and exercises</td>
<td>2.21</td>
<td>1.13</td>
<td>2.06</td>
<td>1.13</td>
<td>2.16</td>
</tr>
<tr>
<td>3</td>
<td>Training on skills for handling of print resources</td>
<td>2.68</td>
<td>0.90</td>
<td>2.77</td>
<td>0.86</td>
<td>2.71</td>
</tr>
<tr>
<td>4</td>
<td>Training on disaster safety procedures</td>
<td>2.66</td>
<td>0.85</td>
<td>2.66</td>
<td>0.91</td>
<td>2.59</td>
</tr>
<tr>
<td>5</td>
<td>Disaster prevention training</td>
<td>2.53</td>
<td>0.97</td>
<td>2.55</td>
<td>1.00</td>
<td>2.53</td>
</tr>
<tr>
<td>6</td>
<td>Training on effective communication of potential hazards to appropriate quarters</td>
<td>2.49</td>
<td>0.94</td>
<td>2.58</td>
<td>0.95</td>
<td>2.53</td>
</tr>
<tr>
<td>7</td>
<td>Training on the identification of disaster incidents detrimental to library resources</td>
<td>2.51</td>
<td>0.94</td>
<td>2.43</td>
<td>1.01</td>
<td>2.48</td>
</tr>
<tr>
<td>8</td>
<td>Training on evacuation of damaged library resources</td>
<td>2.39</td>
<td>0.90</td>
<td>2.51</td>
<td>0.91</td>
<td>2.43</td>
</tr>
<tr>
<td>9</td>
<td>Training on the general handling of disaster equipment</td>
<td>2.36</td>
<td>0.97</td>
<td>2.33</td>
<td>0.91</td>
<td>2.35</td>
</tr>
<tr>
<td>10</td>
<td>Awareness training on disaster management for effective preservation of library resources</td>
<td>2.15</td>
<td>1.02</td>
<td>1.93</td>
<td>1.02</td>
<td>2.07</td>
</tr>
<tr>
<td>11</td>
<td>Training towards the acquisition of special skills on handling of digital resources</td>
<td>2.52</td>
<td>0.98</td>
<td>2.41</td>
<td>0.93</td>
<td>2.48</td>
</tr>
<tr>
<td>12</td>
<td>Flood-fighting drills and exercises Cluster mean</td>
<td>2.02</td>
<td>1.03</td>
<td>1.73</td>
<td>0.90</td>
<td>1.92</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>2.43</td>
<td>0.74</td>
<td>2.41</td>
<td>0.43</td>
<td>2.42</td>
</tr>
</tbody>
</table>

Table II. Mean ratings of respondents on disaster training available in federal and state university libraries.
provided training in the distribution among the available training programs available to library personnel in federal and state university libraries:

RQ2. What are the challenges affecting disaster training programs in federal and state university libraries?

Table III tries to ascertain the challenges confronting disaster training programs in federal and state university libraries in Southwest Nigeria. From analysis, the inadequacy of disaster training facilities and equipment ranked top with a mean score of 3.36. Ranked closely with a mean value of 3.35 is insufficient funding for the services of training agencies/personnel as well as the procurement of relevant disaster equipment. Also rated among the greatest factors militating against the effectiveness of disaster training programs in the studied libraries is the inadequacy of disaster preparedness training drills and exercises for library personnel (3.23). However, management’s lack of concern for disaster preparedness training (3.00) and poor perception of librarians about disaster preparedness training (2.92) portend the least concern to disaster training programs. Relatively, the individual mean by institution suggests that the identified problems tend to be more in federal than state university libraries:

RQ3. What are the appropriate strategies for ameliorating the problems hindering disaster training programs in federal and state university libraries?

Table IV shows the mean ratings of the respondents on strategies for addressing the identified challenges of disaster training programs in libraries. Using the principle of real limit of numbers, the results of the data analysis revealed that all the eight items examined are appropriate strategies for ameliorating the problems of disaster training in the libraries studied considering the mean scores of respondents in both federal and state university libraries. Overall, the provision of adequate relevant disaster training facilities and equipment took the pride of place in the distribution with a mean score of 3.34. Consistently, this item ranked top among the problems earlier identified in Table III. Other important strategies for improving the situation are careful and deliberate constitution of disaster preparedness teams in libraries (3.28) and adequate provision of fund (3.16). However, the respondents are of the opinion that the inclusion of disaster training programs in library disaster preparedness plan (where they are available) is not a significant strategy; as a result, it was ranked least among the items examined with a mean score of 3.00. Comparatively, respondents from state university libraries appear to believe more in the strategies than their counterparts in the federal setting.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Ownership</th>
<th>Overall</th>
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<tbody>
<tr>
<td></td>
<td>Federal</td>
<td>State</td>
</tr>
<tr>
<td>1</td>
<td>Inadequate disaster training facilities and equipment</td>
<td>3.36</td>
</tr>
<tr>
<td>2</td>
<td>Insufficient funding</td>
<td>3.35</td>
</tr>
<tr>
<td>3</td>
<td>Inadequate disaster preparedness training drills and exercises for library personnel</td>
<td>3.27</td>
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<tr>
<td>4</td>
<td>Inadequate disaster training and communication systems</td>
<td>3.24</td>
</tr>
<tr>
<td>5</td>
<td>Exclusion of training from the disaster preparedness plans</td>
<td>3.16</td>
</tr>
<tr>
<td>6</td>
<td>Management’s lack of concern for disaster preparedness training</td>
<td>3.10</td>
</tr>
<tr>
<td>7</td>
<td>Poor perception of librarians about disaster preparedness training</td>
<td>3.01</td>
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<td></td>
<td>Cluster mean</td>
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</table>
5. Discussion of findings

In the current study, it was found that the commonest training program in federal and state university libraries is targeted toward using fire disaster equipment and the most frequent of the trainings is fire drills and exercises. This suggests that fighting fire emergencies is the predominant disaster training program available among the libraries studied. This underpins why fire emergency drills and exercises were the prevailing trainings common to all the libraries examined. The interview response of the UL of the University of Lagos further buttressed the argument when she responded that they regularly engage in capacity building such as workshops, trainings and fire drills to sensitize staff members to be disaster conscious. For the UL of NOUN, the training programs provided for staff members fall within and outside the precinct of disaster issues.

This finding is consistent with that of Ahenkorah-Marfo and Borteye (2010) who reported that the library examined in his study was only ready to fight fire disaster. If the disaster training is restricted to fire emergency only, disaster training in the libraries studied could be considered low. This finding concurs with Abareh (2014) who discovered in his study that sensitization and training in disaster management was low. From the interview conducted, the UL, Ekiti State University, responded that staff disaster consciousness is regularly been created and plans are underway to train staff at national and international conferences. On the other extreme, little or no effort is being made to ensure the development of staff skills for the effective handling of digital resources. This contradicts Styblińska (2006) who found an exponential increase in digital resources preservation among the participants.

With respect to the challenges affecting disaster training programs, inadequate disaster training facilities and equipment took pre-eminence among the studied libraries. This result is corroborated by Ilo et al. (2018) who measured disaster preparedness in Southwest Nigeria using disaster equipment as indicators. The study found out that even though a good number of the disaster equipment examined were available, the core equipment that could aid adequate response and recovery process were unavailable. Insufficient funding was another problem hindering disaster training programs in federal and state university libraries in Southwest Nigeria. This find is consistent with that of Ogumiyi and Adejubee (2014) who revealed that funding is a major challenge facing effective disaster preparedness and response in libraries. Similar results have been reported by Oluwaniyi (2015). The interview response of the UL, Adekunle Ajasin University Akungba corroborates this argument when it was showed that the major problems hindering disaster preparedness in university libraries include the lack of fund and awareness, which ultimately results in poor disaster planning.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Strategies</th>
<th>Ownership Mean</th>
<th>SD</th>
<th>Ownership Mean</th>
<th>SD</th>
<th>Ownership Mean</th>
<th>SD</th>
<th>Overall Mean</th>
<th>SD</th>
<th>Overall R</th>
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<tbody>
<tr>
<td>1</td>
<td>Provision of adequate disaster training facilities and equipment</td>
<td>3.27</td>
<td>0.79</td>
<td>3.45</td>
<td>0.76</td>
<td>3.34</td>
<td>0.78</td>
<td>1st</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Constitution of disaster preparedness team</td>
<td>3.26</td>
<td>0.79</td>
<td>3.31</td>
<td>0.89</td>
<td>3.28</td>
<td>0.83</td>
<td>2nd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Provision of sufficient fund</td>
<td>3.11</td>
<td>0.88</td>
<td>3.24</td>
<td>0.88</td>
<td>3.16</td>
<td>0.88</td>
<td>3rd</td>
<td></td>
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<tr>
<td>4</td>
<td>Provision of disaster training communication systems</td>
<td>3.17</td>
<td>0.78</td>
<td>3.11</td>
<td>0.89</td>
<td>3.15</td>
<td>0.82</td>
<td>4th</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Improved positive perception about disaster preparedness training among librarians</td>
<td>3.12</td>
<td>0.83</td>
<td>3.12</td>
<td>0.86</td>
<td>3.12</td>
<td>0.84</td>
<td>5th</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Periodic disaster preparedness training drills and exercises for library personnel</td>
<td>3.00</td>
<td>0.92</td>
<td>3.20</td>
<td>0.95</td>
<td>3.07</td>
<td>0.93</td>
<td>6th</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Managements’ improved concern for disaster preparedness training</td>
<td>3.00</td>
<td>0.86</td>
<td>3.15</td>
<td>0.94</td>
<td>3.05</td>
<td>0.89</td>
<td>7th</td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>Inclusion of training in the disaster preparedness plans</td>
<td>3.01</td>
<td>0.92</td>
<td>2.99</td>
<td>1.00</td>
<td>3.00</td>
<td>0.95</td>
<td>8th</td>
<td></td>
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</table>

Table IV. Mean rating of the respondents on the strategies for addressing disaster training problems in federal and state libraries
The provision of adequate disaster training facilities and equipment was found to be the most effective strategy for addressing disaster training challenges. This suggests that disaster training cannot be effective if the requisite kits are lacking. A recent study showed that the availability of relevant disaster equipment and effective disaster preparedness can only be correlated if training is considered an integral part of the process (Ilo et al., 2018). Equally strengthening the role of equipment in the training of library staff, the UL, Osun State University Osogbo responded during the interview that “we are making effort to purchase relevant disaster equipment to adequately put disasters to check.” The striking importance of this finding is that the same factor was earlier found to be the greatest challenge confronting disaster training among the libraries examined.

Constituting a disaster team was also found to be a proactive measure toward making disaster training effective. This finding is in tandem with the position of Muir and Shenton (2002) who affirmed that for efficient disaster preparedness training, the inclusion of disaster preparedness and response team among other factors are vital, as reported by Kostagiolas et al. (2011). Earlier, Kaur (2008) citing Lyall (1996) noted the importance of incorporating into the disaster plan a list of dedicated members to form the disaster team. Provision of fund has also been highlighted as a major strategy for overcoming the identified challenge. This outcome lends credence to McCook (2011) who asserted that the provision of long-term funding for extensive disaster training ensures the optimal functioning of all disaster agencies. Oghenetega and Uméji (2014) have also lent their support for adequate funding in libraries for efficient disaster management.

6. Recommendations
From the foregoing, the study recommends that:

(1) Disaster training programs should not be restricted to fire drills and exercises alone as libraries and their resources are prone to several forms of disasters. Effort should be made to extend available disaster training for handling flooding, leaking roofs and broken pipes, as well as other environmental and biological factors capable of destroying the library and its resources.

(2) Relevant disaster facilities and equipment should be adequately provided to expedite the training process thereby equipping library personnel with relevant skills needed to deal with emergencies that pose significant threats to libraries and their collections.

(3) Provision of fund is germane for worthwhile disaster training and preparedness undertakings. Therefore, library authorities should synergize with relevant disaster funding agencies to source for fund for the procurement of relevant disaster equipment and training programs.

(4) Obviously, the available expertise in preventing, responding and recovering from disaster in Nigeria is grossly inadequate in comparison to what obtains in the developed world. To this end, university libraries in Nigeria should collaborate with relevant agencies in the developed nations with a view to tapping into their wealth of disaster management expertise through the training of library personnel.

7. Conclusion
Having examined the implication for disaster training programs and the associated challenges on federal and state university libraries in Southwest Nigeria, evidence abounds that disaster training would be more effective if an all-inclusive disaster preparedness approach that cuts across all (existing and potential) vulnerabilities is adopted. Globally, it appears that libraries are better prepared to handle fire emergency than any other known
disaster as literature reveals. The deducible justification for this claim particularly in the Nigerian context lies within the precinct of its disaster antecedents. Because disasters occur without prior warnings, the scope of disaster training in libraries should be broadened to accommodate other threats. Furthermore, the training must be designed to familiarize disaster team members with the architectural design of the library facility as well as the utilities, e.g., the location of major electrical equipment and their control switch, fire extinguishers, stack and office areas, etc., for prompt action.

References


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Appraisal of fire safety interventions and strategies for informal settlements in South Africa

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Abstract

Purpose – Informal settlements are inherently unstructured in nature, lack adequate services, regularly have high population densities and can experience social problems. Thus, fires can easily propagate rapidly through such areas, leaving thousands homeless in a single fire. The purpose of this paper is to present an appraisal of various interventions and strategies to improve fire safety in informal settlements in South Africa (globally, similar settlements are known as slums, ghettos, favelas, shantytowns, etc.), considering aspects of both technical suitability and social suitability.

Design/methodology/approach – This paper focuses on three specific aspects: ignition risk management, active fire protection interventions and passive fire protection interventions. These are presented within a framework to outline how they may mitigate the impact of fires.

Findings – Often “solutions” proposed to improve fire safety either lack a sound engineering basis, thus becoming technically inefficient, or do not consider social circumstances and community responses in settlements, thereby becoming practically, socially or economically unsuitable. It must be understood that there is no “quick fix” to this significant problem, but rather a combination of interventions can improve fire safety in general. A broad understanding of the various options available is essential when addressing this problem, which this paper seeks to provide.

Practical implications – This paper seeks to provide an overview to guide policymakers and organisations by illustrating both the advantages/benefits and disadvantages/challenges of the interventions and strategies currently being rolled out, as well as potential alternatives.

Originality/value – A broad but succinct appraisal is provided that gives insight and direction for improving fire safety in informal settlements. It is hoped that the challenges associated with the fire safety interventions discussed can be addressed and improved over time.

Keywords Informal settlements, Fire safety, Socio-political-economic challenges, Interventions, South Africa, Resilience framework, Community risk reduction

Paper type Research paper

1. Introduction

Approximately, 1bn people currently live in informal settlements globally. It is estimated that by 2050, there will be 1.2bn informal settlement dwellers in Africa alone (UN-Habitat, 2016). With a growing population and rapid urbanisation, city infrastructure and housing...
availability are often insufficient or unsuitable (economically and socially) in many countries. This has led to an increasing number of informal settlements forming around cities, and these are highly vulnerable to fire. Worldwide, there are currently over 300,000 fire-related deaths per year, with over 95 per cent of all burn deaths occurring in low- and middle-income countries, and there are additionally over 10m disability-adjusted life years lost each year due to burn-related injuries (Mock et al., 2009).

Pharoah (2009) noted that in South Africa: “Informal settlements occupy an ambiguous legal position – they are technically illegal but residents are protected by legislation granting them de facto tenure rights by virtue of living on the land, and are broadly characterized by a lack of formal housing and service delivery”. The definition of an informal settlements varies, but in South Africa it can be considered, from a state’s perspective, an “unplanned settlement on land which has not been surveyed or proclaimed as residential, consisting mainly of informal dwellings (shacks)” (SACB, 2012), i.e., dwellings with no formal approval to exist. Like many other formal and informal settings, these settlements can experience significant social problems, and whilst inhabitant’s incomes vary, many are economically poor. Homes are constructed from any readily available material, generally making them highly combustible, as shown in Plate 1 (Walls et al., 2018). Coupled with potentially high dwelling densities, inhabitants storing materials in and around homes, and poor construction materials and techniques, conflagrations can become large, behaving in ways more akin to that of wildland fires (due to the distributed fuel load, accompanied by very permeable structures), rather than typical structural compartment fires (Walls et al., 2017).

Unfortunately, in South Africa, accurate data from fire cause and determination in the informal settlements are frequently absent or incomplete with approximately one-third of fire causes reported as “undetermined” (FPASA, 2016). The missing causal data often lead to piecemeal approaches and inappropriate interventions, resulting in outcomes that do not reduce the risk and associated destruction and death.

2. Comparison of interventions for fire safety in informal settlements in South Africa

This paper discusses selected examples to illustrate the various interventions that have been implemented and could potentially be implemented to help mitigate the fire problem in informal settlements. The information presented in this paper is based upon first-hand experience of informal settlement fires and interventions, informal discussions with municipal officials, informal and formal interviews with firefighters, personal volunteering experience with non-governmental organisations (NGO) involved in low-income communities, the application of fire safety engineering and data accessed from the literature. Although the work is based on the research conducted in South Africa, it will typically be applicable in other countries with
informal settlements and transitional inhabitants (i.e. refugee camps), where similar social, political, economic environments occur, and with similar morphologies of structures. Furthermore, it is important to note that when considering interventions that are successful in one community, they may not be successful in another due to social structures, cultural preferences, municipal experience and capacity, weather, topography and similar associated factors, and reported data should be interpreted accordingly.

Although the majority of research presented has been conducted in the Western Cape and Gauteng regions, the effectiveness of interventions in other areas will be more influenced by cultural, economic and community factors, rather than geographic location. For instance, settlements in the vicinity of industries discarding wooden pallets, or in more rural areas, will typically have a larger number of dwellings constructed from timber, which leads to higher fire spread rates (Walls et al., 2018) potentially negating the influence of certain construction techniques meant to reduce fire spread. Conversely, dwellings in cities utilise discarded steel sheeting more commonly, making techniques for applying products to steel sheeting more suitable. Furthermore, in coal mining areas, coal stoves are more prevalent for cooking, whilst in larger metropolitan areas, paraffin stoves may be more common. In a city, settlements which are closer to areas where employment may be available will typically be denser, whilst those further out are often less dense, leading to less severe fire (Walls and Zweig, 2017). However, settlement density can also be influenced by the factors such as the age of settlements and the accessibility of public transport.

In this paper, the following specific categories are considered: fire prevention, active fire protection and passive fire protection. Fire prevention refers to activities, systems, products, interventions and construction materials designed to reduce the risk of ignition. Active fire protection refers to the systems or items such as fire brigades, sprinklers or alarm systems which require a response (either human, mechanical or electrical) for them to be effective. Passive protection refers to the inbuilt resistance of systems, typically in terms of construction products (Buchanan and Abu, 2017), whereby homes become less combustible. Plate 1 presents a framework bringing these aspects together, and also considers how they interrelate to influence fire safety. Education ultimately influences all interventions as it may reduce the likelihood of someone accidentally starting a fire, help them know how to quickly extinguish a fire with the correct system when it does occur and provide them with knowledge of how to build in such a way as to reduce fire spread. Hence, education is an over-arching category, although often more closely linked to fire prevention. All three categories discussed must also be considered during the reconstruction phase of settlements, such that communities “build back better”.

The letters in brackets in Figure 1 refer to the scenarios which may theoretically occur depending on the level of emphasis and resources supplied for the different interventions. [A] Due to a strong emphasis on active fire protection (e.g. a well-equipped fire brigade), there is capacity available to stop fires quickly. However, fires spread faster and occur more often. [B] Due to well-protected homes, i.e. good passive protection, fires spread more slowly and sometimes are contained in areas, thereby reducing spread. However, larger fires cannot be stopped, and fires still occur regularly. [C] Fires do not occur often due to greatly reduced ignition risks (e.g. good electrification and safe cooking systems). However, when they do occur, they spread quickly and are not easily stopped. [D]–[F] form a combination of the aforementioned scenarios. [G] Through the provision of multiple fire safety interventions, in combination with educational initiatives, an integrated fire safety solution/system is produced for communities. However, in reality, scenario [G] will only occur if sufficient resources are available and communities are very involved, which is often not the case for informal settlements. However, a well-thought through holistic strategy can bring scenario [G] closer to being a reality, which is the aim of this paper.
Twigg et al. (2017) proposed a Haddon’s matrix for a systematic analysis of fire risk in low-income/informal settlements, providing an international view on the problem. The framework proposed in this paper could be used in conjunction with such a matrix as it provides a complementary manner of considering fire risk, whereby at each stage (pre-event, event or post-event in the Haddon’s matrix), interventions that provide active protection, passive protection or fire prevention can be investigated.

3. Fire prevention

By reducing the risk of ignition in settlements, the occurrence of fires can be drastically reduced. Fire risk in informal settlements often stems from socio-economic conditions where people rely on “cheap but hazardous sources of energy and light, particularly candles, paraffin stoves, hearth fires and illegal electricity connections” (Pharoah, 2009). The following projects demonstrate both the potential benefits and challenges associated with fire prevention in the informal settlement environment.

3.1 Electrification of dwellings

A challenge encountered with informal dwellings in South Africa is that households do not generally have legal tenure (Kovacic et al., 2016), and are regularly not provided with formal, metered electricity. However, even when electricity is provided, a study by Francioli (2018) has found that 67.2 per cent of informal settlement residents employ “energy stacking”, where inhabitants alternate between electric and non-electric (especially paraffin) energy sources. Similar findings are presented by Kovacic et al. (2016).

The provision of electricity can decrease the reliance of fuel sources such a paraffin, candles and gas, thereby reducing risk. Various sources cite electrification as an important step towards reducing the use of more dangerous energy sources, based on investigations in multiple settlements (CoCT, 2015; Louw et al., 2008). Electricity usage in the settlements has a wide variety of safety issues as inhabitants will often use faulty electrical wiring and/or overload plug points with a number of appliances, resulting in the increasing frequency of fires (Zweig et al., 2018). Not all electrical supplies are legal, as people illegally connect into
existing electrical infrastructure. Figure 2 shows many illegal electrical connections in a settlement, where small diameter wires are carrying current between homes, often draped across hot, steel roofs (Govender et al., 2011). These illegal connections can easily cause short circuits leading to increased fire risks. Furthermore, the presence of such cables limits access for responding fire services in that they cannot easily drive fire trucks into areas due to the low-hanging cables, and need to turn off electrical supplies to an area before they can safely use hoses. Furthermore, certain communities culturally prefer the use of open fires over electricity, due to social interactions. It is interesting to note that of 5,496 recorded fire incidents in informal settlements in 2015 in South Africa, 862 were due to electrical problems, whilst 879 were due to open flames. A further 637 incidents were due to cooking or heating, although it is unknown what energy sources were used in these cases (FPASA, 2017).

3.2 Cooking, lighting and heating of dwellings
Various solutions have been proposed for improving cooking, lighting and heating in informal dwellings. These include solar systems for homes (iShack (Slum Dwellers International, 2013)), improved candle usage (the Safer Candle Project (Mtambeka et al., 2012)) among many others.

The poor quality of low-cost paraffin cooking appliances, often the only affordable option for many poor informal settlement households, can lead to rapidly spreading conflagrations. In 2003, the Paraffin Safety Association of Southern Africa (now defunct) commissioned independent tests on nine of the most popular paraffin stoves sold in South Africa. The tests revealed that all of the wick stoves tested spilt fuel when knocked over immediately, resulting in a rapidly spreading fire (Lloyd and Truran, 2008).

Any system that can provide safer cooking, lighting or heating systems for dwellings will not only need to improve fire safety, but also be affordable and appropriate for use. Also, a number of the units, such as safer candleholders, are relatively inexpensive therefore can be rolled out to a large number of people. Codes of practice do exist for the manufacturing of paraffin stoves (SABS, 2012), although it is questionable to what extent products sold in settlements comply with these regulations, and to what extent regulations are suitable and enforced. Any device issued free of charge to a community that has resale value may be sold. Also, individuals must maintain these devices, and as such, they may become unused and neglected, especially when the maintenance,
i.e. replacing batteries, is considered an unaffordable expense. In visits by the authors to homes where smoke alarms have been installed (particularly in the Breede Valley Municipality), it has been observed that 9 V smoke alarm batteries have been removed and placed into TV remotes.

4. Active fire protection

4.1 Fire brigades

Fire brigades will always play a pivotal role in fighting fires. The presence of a high-standard fire brigade with access to the settlements coupled with an efficient alarm system can reduce the chance of an uncontrolled fire by orders of magnitude (Twilt, 1994). This is true in both developed and developing countries worldwide. The details below are based upon interactions and interviews with firefighters in South Africa at the Hout Bay, Constantia and Breede Valley fire stations.

One could assume that in developing countries, fire services do not necessarily receive the budget required to provide sufficient human and equipment resources in the case of large fires. However, even when firefighters have sufficient resources, firefighting activities can be difficult due to limited access to the area where the fire is occurring (including structural limitations of dwelling spacings and overhead power lines), challenges in locating fires due to settlements having few road names and street numbers, tensions between residents and firefighters, limited water supplies, safety concerns and people evacuating settlements with their possessions which blocks access ways. A recent report on the Imizamo Yethu fire in 2017, which left 10,000 people homeless, highlights such factors (Saayman, 2017), documenting interviews with the Hout Bay Fire Station members which claimed that during firefighting operations, multiple hoses were cut by residents, such that residents might redirect water onto their own burning dwellings. This greatly compromises firefighting operations, as water and hose systems have to be reinstated and cut hoses use the water in a less efficient manner. Furthermore, due to a variety of reasons, firefighters may be attacked (African News Agency, 2016), which can influence response times and the ability of brigades to enter certain areas.

The use of emergency numbers in an uncontrolled fire is a critical requirement to mobilise the fire services. Unfortunately, in South Africa, widespread confusion regarding which number to use remains a problem. A common occurrence is that the police services number (10111) is called by inhabitants during a fire, resulting in a delay as the call must first be answered, addressed and then transferred through to the fire services number. Ten-digit emergency numbers are still marketed widely, as in the case of City of Cape Town which markets 107 for a landline and 021-480-7700 from a mobile. Mobile service providers are required to allocate 112 as a toll-free number for all emergencies, although, as mentioned above, it is often not dialled.

4.1.1 Hydrants. Fire hydrants can provide a consistent water source for extinguishing fires. Informal settlements often are constructed in areas not previously serviced by bulk infrastructure (Myburgh, 2012); therefore, the installation of fire mains is a complex socio-political and economic calculation. Also, when hydrants are constructed, it has been observed in communities (e.g. in Imizamo Yethu and in discussions with consulting engineers contracted by local municipalities) that an inhabitant may build their home over the hydrant to use it as a personal source of water, and then potentially sell the water to other members of the community. After responding to a fire in Alexandra, Johannesburg, which destroyed 500 homes, firefighters noted that only one hydrant could be found due to homes being built over the remaining hydrants (Molosankwe, 2018). In an assessment of five municipalities in the Western Cape region of all fires extinguished, 8.6 per cent were extinguished using water from a hydrant, whereas the majority were
extinguished using water from a pre-filled tanker vehicle (Myburgh and Jacobs, 2014), although further detail is required on the exact statistics specific to informal settlements. However, in larger conflagrations, the use of tankers becomes challenging as they need to be constantly refilled.

4.2 Community response teams
Providing community members with the skills and knowledge to respond to fires in the early development stages of the fire while the fire and emergency services mobilise to respond can reduce the level of damage and potential injury from the fire. Community emergency response teams (CERTs) have been trained for this purpose by several fire services (Chauke, 2017). The emergency first aid responder (EFAR) system is a low-cost model implemented by the emergency medical services that can be used in a developing region, both to lay the foundation for an emergency care system and support a new one to maturity (Sun and Wallis, 2012). This functions on a similar principle to CERTs.

If community members are able to attend to fire ignitions early, the rapid response can potentially significantly reduce the chance of out-of-control fires developing. As with many projects of this nature, the identification, training and funding of community teams is an ongoing task requiring significant input, as has been identified with projects within the City of Cape Town. Another major problem associated with community teams is that they are often not sustainable due to the inconsistent availability of the trained members within a given community. Members may move away from the area, stop serving on teams, or be at work during an incident. Furthermore, as communities change, it becomes problematic continually replacing and retraining members, while holding inactive team members who do not respond to incidents accountable.

4.3 Smoke and fire alarms
Smoke and fire alarm systems are required as a part of the fire safety strategy by many international building codes for offices, industrial buildings and sometimes in residential buildings (SABS, 2011). Their effectiveness has been proven in improving life safety by providing occupants additional time to escape or fight a fire (Bukowski et al., 2008). In a recent project in a single settlement in Cape Town, 1,400 homes were provided with detectors, and the influence of the detectors was monitored (Zweig et al., 2018). Figure 3 presents an aerial view of a settlement, named the Wallacedene TRA in Cape Town, in which each home received a photoelectric detector and its effectiveness was monitored over 2017/2018. During this time, eight real activations occurred, where fires were stopped, and it appeared that many lives would have been lost if the detectors were not there. The effectiveness of photoelectric, ionisation and rate-of-rise heat detectors has been assessed in full-scale shack tests in South Africa, considering both smouldering and flaming fires (Walls et al., 2017). Preliminary results of the research indicate that photoelectric smoke alarms are suitable for addressing both smouldering and flaming fires in informal dwellings in South Africa, but further research is required.

Detectors are relatively easy to install in dwellings and communities can become actively involved in the installation process. Photoelectric detectors can be obtained in large numbers which cost approximately R150 each (approximately $13 at time of authorship) and come with a ten-year lithium battery, reducing the requirement for inhabitants to replace the batteries. However, in the pilot studies mentioned above, insect infestation has been noted in multiple detectors, especially for photoelectric smoke alarms. Methods for modifying detector housings to reduce insect infestations are currently underway. Additionally, inhabitants have been found to remove the 9 V batteries of some detectors; however, this has not yet been quantified or qualified adequately so there are no data yet on how frequent or permanent the battery removal is. There can be many reasons for battery
removal, ranging from nuisance alarms (i.e. alarms going off due to cooking activities rather than for fire reasons) to a perceived greater need of the batteries in other devices (e.g. TV remote).

4.4 Dry firefighting methods
In countries such as Japan, dry firefighting methods have been employed historically, where inhabitants would manually pull down structures in front of a fire to create a fuel break (Bankoff et al., 2012). Historically, the authors are aware of the application of dry firefighting measures where Casspirs (a landmine resistant, military-type vehicle), or other vehicles, were used in the various townships to bulldoze structures ahead of a blaze with the aim of creating a break in the fuel. The right-hand side photo of Plate 2 shows black marks where
each represents a house that was demolished during operations and in which areas the vehicle shown was active. However, such practices have been stopped.

Fuel breaks can provide an effective means for limiting fire spread and can potentially provide an access point for firefighters. Though, depending on how well informal dwellings are built, it can be very challenging to knock down structures. The authors have witnessed, on many occasions in the Gauteng and Western Cape regions, during real fire events and with varying degrees of success, firefighters and inhabitants trying to knock down dwellings to try form fuel breaks. It also has safety risks if structures collapse on people. The demolition of structures using large vehicles has significant safety implications as it is possible that inhabitants may still be within dwellings, and communities may become hostile (with justification) if they feel their homes are about to be destroyed.

4.5 Sprinklers
Sprinklers are extensively used throughout the world to suppress internal fires and are commonly found in offices and even residential dwellings in many countries. They substantially reduce the probability of a fire becoming out of control when they correctly operate (Melinek, 1993). It has been proposed that overhead automatic sprinkler lines could be installed in informal settlements to detect and extinguish fire before they become out-of-control, and computational fluid dynamics modelling has been done to demonstrate this (Barker, n.d.).

While technically feasible, there are numerous challenges faced by such systems including: the need for regular maintenance, cost of implementation and a lack of water pressure on municipal lines. Additionally, if the system has been implemented in areas without a regular water supply, inhabitants may modify the system to provide domestic water for their home. The systems would also need to be modular to expand (both in water capacity and length of pipework) with expanding settlements.

5. Passive fire protection
Passive protection measures are those which provide additional fire resistance without requiring human intervention (Buchanan and Abu, 2017), by means of their non-combustible nature, compartmentation function or thermal insulating properties. Several passive protection projects in informal settlements are discussed further.

5.1 Code application and enforcements
Fire services are responsible for the application and enforcement of municipal by-laws and ensure that buildings comply with the National Building Regulations (SABS, 2011). This is achieved by the means of routine inspection of buildings, ensuring the implementation of sound fire engineering principles and practices, and by liaising with the public, consultants, architects and other role players where necessary punitive measures are taken if there is gross non-compliance or repeat non-compliance. This can apply to both active and passive fire protection measures.

Historically, the implementation of building codes has resulted in a significant decrease in fires in developing countries (Bankoff et al., 2012). As mentioned in Section 3.1, informal dwellings typically are considered “illegal” dwellings. Hence, enforcement within the informal settlements environment is virtually non-existent as dwellings are not considered under building code regulations. Hence, it is unclear if, and how, building codes can even be applied. This also complicates the testing and validation of any interventions that could be rolled out in settlements, as it is unclear how national codes of standards should be applied (SABS, 2005). Recent work by Stellenbosch University, yet to be published, has produced a benchmark test for evaluating the performance of suppression systems such
that the comparative effectiveness of methods of suppressing fully developed fires can be investigated, which could potentially assist the problem of assessing the suitability of interventions.

5.1.1 Construction materials for dwellings. Internationally many countries, such as Japan, Russia and Turkey (Bankoff et al., 2012), have historically experienced large fires in low-income areas due to buildings being constructed of highly flammable materials. With the introduction of masonry structures, the occurrence and spread of fires in these countries has decreased over many decades. Hence, it should be understood that the provision of fire-resistant construction materials significantly reduces the impact of fires, as commonly enforced by modern building codes. In South Africa, numerous initiatives have been developed for shacks, such as the “Touching the Earth Lightly” home and the “Green Shack”, which are reported to have improved fire resistances due to fireproof boarding or garden walls (Slum Dwellers International, 2013).

In informal settlements, there are various factors which limit the extent to which non-combustible materials are used, such as: insufficient funds of inhabitants or municipalities to afford better quality construction materials, lack of tenure leading to inhabitants being unwilling to upgrade their own premises as they know they could potentially lose possession of the land at some future time and even if individuals upgrade their homes, the people around them may not which could still result in the loss of their home in the event of a fire. The latter factor would require larger numbers of homes in an area to use fire-resistant construction materials to have an impact.

5.1.2 Provision for escape from shacks. In South Africa, shacks are often equipped with burglar bars, security gates and other such features to protect the contents of the inhabitant’s home. However, in the event of a fire, these security measures can become barriers for safe egress (Ntongana, 2018), especially if they wake up when smoke has already filled their dwelling (Quintiere, 2016). More effective methods may include escape latches or burglar bars that can be unlocked from the inside. To improve the likelihood of safe escape, many inhabitants create a weakened wall panel somewhere in their dwelling, which they know they can break through in the case of emergency. More complex escape mechanisms will require additional costs and technical knowledge to make, resulting in inhabitants resorting to simpler methods. Such a weakened escape zone can be provided relatively easily. Unfortunately, if criminals are aware that people in an area have weakened zones in the dwellings, they may exploit these to break into homes. With crime prevention typically being a higher priority, residents may favour security measures over fire safety measures.

5.1.3 Firewalls. Building codes of practice specify maximum areas and structures should be divided into compartments (SABS, 2011), with fire-rated walls between, such that in the event of a fire, only a limited portion of the structure will be affected. It would be possible to construct firewalls for informal settlements from various non-combustible products such as masonry or concrete. Innovative systems have also been developed, with a view to creating firewalls, such as the “Green Shack”, where a garden wall and irrigation is used to create a non-combustible barrier.

Benefits are similar to those discussed for construction materials above, and firewalls would slow down the progress of a fire. A well-constructed dividing wall would invariably stop smaller fires and increase evacuation times for residents. Fire spread in the informal settlement can occur through fire brands. Firewalls do not prevent fire brands, which in wind-driven conflagrations can be transported many kilometres (Koo et al., 2010). Fire brands are small, burning particles that are transported long distances through the plume of a fire (Simeoni, 2016). These cause spot fires ahead of a fire front. Feedback from firefighters that responded to the Imizamo Yethu indicates that firebrand spotting did occur during the
fire (Saayman, 2017), although the influence of spotting on the rate of informal settlement fire spread is yet to be investigated and quantified. Also, the presence a well-constructed masonry or concrete wall to provide an independent settlement level fire barrier may lead to inhabitants building structures along the wall such that they can reduce their own material usage, and have a stable, thermally insulated wall.

5.2 Structural area reconfiguration – Re-blocking, fire breaks and the use of roads
Settlement planning and design can significantly affect the spread of a fire through a settlement, the ability of individuals to escape and firefighting activities (CSIR Building and Construction Technology, 2000). Re-blocking of settlements (as shown in Figure 4) involves the planned restructuring of a buildings and pathways to create an order and planned layout of households and access routes that are acceptable for all stakeholders. It is often done in conjunction with NGOs or local government departments (Sokupa, 2012) and ideally with local inhabitants. Figure 4 presents how the re-blocking of the Mshini Wami settlement was carried out. The City of Cape Town (2013) has developed a policy which serves to inform the City’s activity in the proactive re-blocking of informal settlements in order to provide a safer urban structure. Plate 3 shows the burn scar of the Imizamo Yethu fire in March 2017, where approximately 10,000 people were left homeless (Pluke, 2017). The steep terrain and lack of access routes for larger vehicles made firefighting efforts very difficult and exacerbated the spread of the fire. After the fire, this area was currently being re-blocked to allow for improved access.

The construction of access roads and fire breaks plays a significant role in assisting firefighting efforts as teams can reach fire origins more quickly and put them out. However, various challenges are faced when trying to create fire breaks, pathways or access roads. First, if pathways are not maintained, people will often extend their homes into empty adjacent land, especially when family members from other areas move in with them (Francioli, 2018). The construction of any facilities within an existing settlement is very difficult as it requires that people be moved to accommodate widened access ways. There is often not enough additional land to rehouse people. Also, in settlements, there are sometimes “landlords” who own multiple shacks and exert varied forms of influence in the local area. They rent these structures out and their income is influenced by the amount of rentable space they have. Such “landlords” often are extremely antagonistic (through putting pressure on renters to reject proposals) towards any layout changes which results in them having less rentable space, even if it means a safer and better structured area, as identified in interviews with City of Cape Town officials during the reconstruction of Imizamo Yethu after the large 2017 fire (Pluke, 2017).

Appraisal of fire safety interventions

Figure 4. Before (left) and after (right) re-blocking in the Mshini Wami informal settlement, showing the creation of an efficient area layout.
5.3 Considering settlement density and layouts

It is hypothesised that fire spread through informal settlements has characteristics of wildland fire behaviour (Walls et al., 2017) in that there is fuel distribution across a wide area with much of the fire development occurring in the open. In wildland fires, the parameters that have the most significant influence on fire behaviour are the fuel properties (physical and chemical), moisture content, spatial distribution, wind and topography (Simeoni, 2016). Hence, increased settlement density leads to increased fire risk. When associated with high winds, steep terrain and dry conditions (all present in the Western Cape of South Africa) firefighting becomes extremely difficult. Hence, it would be beneficial when developing low-income settlements to try reduce population density.

Reduced population density would significantly decrease fire risk and the rate of fire spread through settlements. Unfortunately, the very reason for informal settlements is that there is insufficient affordable and appropriate housing near places of work. Land that is available for development is typically further from city centres where job opportunities are more scarce, so individuals may choose to stay in densely packed settlements rather than relocate to new settlements with lower densities.

5.4 Passive protection to existing structures

5.4.1 Provision of board and insulation systems. Various board systems exist that can be used to protect structural elements from the effects of fire (Walls, 2016), which include calcium-silicate, magnesium oxide, gypsum, biomass and other such boarding systems. It would be possible to install such boards within shacks to make them more thermally insulated and have a significantly higher fire rating. In the reconstruction of settlements damaged by fire, the authors have heard proposals for developing “strong bands” of houses with increased fire resistance to try compartmentalise fires, where fire-resistant boards, among other products, could be used for this purpose. Such initiatives are yet to be tested and fully documented.

Fire-resistant boards will slow down the progress of fire spread in a settlement by providing a convective and radiative barrier. Boards also provide thermal insulation in Winter. Boarded construction is highly susceptible to how systems are fixed, and openings adjacent to boards can negate the protection they provide. Hence, if not properly installed,
they may have a significantly reduced impact. There has been, as yet, no quantification of the performance of boarded systems within informal dwellings and so there is no ability to say whether badly installed boards is still an improvement on no boards or not, or the degree to which properly installed board systems mitigate fire spread. There are also issues about who provides the boards and associated maintenance costs, to ensure that modifications to the board systems maintain the intended fire spread barrier.

5.4.2 Intumescent paints. In the City of Cape Town, the Khusela Ikhaya Project (Protect Home in isiXhosa), among others, aims at applying intumescent paint to informal dwellings in various informal settlements. Intumescent paints are heat-activated paints that form a protective insulating char layer to reduce heat transfer and protect the surface that it is applied to in the case of a fire (Walls, 2016). They consist of two components: a resin binder and a chemical mixture that release a gas and decomposes upon heating. When heated, the products melt and release a gas that causes a foam-insulating layer to develop (Krishnamoorthy and Bailey, 2009). These paints can typically expand between 15 and 40 times their original thickness.

Intumescent coatings protect the substrate layer they are applied to, reducing the temperatures that layer will experience. This might reduce structural collapses from occurring and reduce the radiative heat from these structures, thus potentially reducing fire spread. Unfortunately, extensive testing in “real” environments has not accompanied the roll-out of this project so certain aspects of the coatings performance remain unclear, including: most informal settlement dwelling construction is fairly permeable and hot gases and radiation will penetrate around treated panels, through the openings between walls and roofs, and through other openings such as doors and windows. Intumescent coatings are highly susceptible to the quality of the surface preparation. Unprepared surfaces may cause paints to delaminate during the expansion process rendering the protective coating ineffective. UV and other ageing processes of coatings may become a problem with time, unless products are specifically designed for external application. Degradation due to weathering and ageing inhibits the expansion performance of the intumescent coatings (Vahabi et al., 2015). The authors have witnessed pictures from real fires in Imizamo Yethu where painted houses were burnt down in spite of being protected. It appears that piloted ignition through openings resulted in the paint being ineffective in providing protection.

5.4.3 Fire safety kits. Various municipalities have developed kits that can be issued to inhabitants to improve fire safety. For instance, the City of Johannesburg issued approximately 1,000 kits (the “Jozi Safety Kit”) to informal settlements and other vulnerable communities. The kit includes a para-safe stove, a hydro gel and bandage to treat minor burns, solar lantern light, paraffin container with a safety cap, smoke detector, fire retardant spray and a 25-litre bucket to store water (CoJ, 2017; Mulaudzi, n.d.).

The presence of fire safety devices, better cooking systems and smoke detectors will invariably reduce fire risk. According to the City of Johannesburg, they have observed a 50 per cent reduction in fire incidents and fatalities in the areas where the Jozi Safety Kits have been introduced (Mulaudzi, n.d.). However, the giving away of fire safety kits, particularly smoke alarms, does not guarantee installation or use by informal settlement households. Furthermore, people have to be trained how to use the contents, items may be sold by recipients and care must be taken to ensure that kits are fairly distributed. The contents of the safety kits also should be required to go through regulation procedures to ensure they are consistently safe.

6. Conclusions

This paper has presented an overview of various interventions that could be applied to improve fire safety in informal settlements. It is important that decision makers have a broad...
understanding of the various strategies and interventions that could be employed, and this work has sought to provide such a summary. All interventions have challenges associated with them and there is no easy solution to the conflagrations being experienced in informal settlements. Furthermore, interventions that are effective in one community may become ineffective in another community due to factors such as social dynamics, leadership structures, settlement topography and layouts, access to electricity and associated factors. It must be understood that a holistic approach is required, and one that has community involvement and continual support and monitoring, such that the system proposed in Figure 1 can be realised.

The framework presented provides a useful structure for developing holistic responses and strategies for improving fire safety. Through the application of procedures to enhance fire prevention (Section 4), the provision of active fire protection systems (Section 5) and the installation of passive fire protection to measure (Section 6) the chance of a fire, the ability to suppress a fire and the rate of fire spread can be improved. A disproportionate focus on one area, at the expense of the other two, may lead to interventions being only partially effective.

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Effects of the classification system in international SAR
The case of the 2015 Nepal earthquake

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Abstract
Purpose – The purpose of this paper is to analyse if the classification system introduced by International Search and Rescue Advisory Group (INSARAG), or INSARAG External Classification (IEC), contributes to effective international search and rescue (SAR) activities in the 2015 Nepal earthquake.

Design/methodology/approach – In addition to the data collected by Office for the Coordination of Humanitarian Affairs and the United Nations Disaster Assessment and Coordination (UNDAC) team, the data were collected by one of the authors who was deployed to Nepal as part of the UNDAC just after the earthquake. Interviews with the deployed international SAR teams and the INSARAG Secretariat were also conducted.

Findings – Although more than 50 teams have been classified in IEC, some IEC-classified teams could not utilise their full capabilities in the Nepal response. For example, they did not necessarily arrive in Nepal earlier than the non-classified teams, but it was because the affected country did not prioritise the IEC-classified teams. To save more lives by international teams, INSARAG will need to raise the awareness of IEC in receiving countries, consider the good regional balance of IEC-classified teams and facilitate strengthening local SAR capabilities through the IEC process.

Originality/value – The added value of this study is, by combining the evidence-based field reality and academic analysis, to find out the existing problems in the field and to provide tangible recommendations for further improvement of the IEC system, which will then lead to saving more lives.

Keywords INSARAG, International disaster relief, Search and rescue, 2015 Nepal earthquake

Paper type Research paper

Introduction
In recent years, many countries send international search and rescue (SAR) teams beyond their state borders in response to massive scale earthquakes. However, deployments of international SAR teams need a lot of costs as they need to transport their personnel and SAR equipment, which can be more than 10 tonnes. If they cannot save live victims despite its cost incurred by their deployments, the reasons behind this and possible measures for improvement should be explored.

The studies on the international SAR assistance so far have tended to focus on whether assisting countries provided it and affected countries received it or not from the perspective of “disaster diplomacy” (e.g. Kelman, 2006; Ker-Lindsay, 2007). While the focus of disaster diplomacy is the impact of international SAR deployment on international relations, whether international SAR teams contributed to saving lives in the field, or its operational side, has not been carefully studied. This paper will focus on the operational side of international SAR in the field.

Table I shows the list of the major earthquakes that hit the Asia–Pacific (AP) region in the last ten years (2008–2017) and received international SAR teams. The numbers of deployed international SAR teams and the numbers of live victims who were rescued by them are also included.

In the Christchurch Earthquake, the one live victim was rescued by the Australian team. In the Nepal earthquake, 11 out of 16 live victims were rescued by the Indian teams. If the live rescue operations conducted by these neighbouring countries are excluded, only the five people in the Nepal earthquake were rescued by international SAR teams in the AP
region in the last ten years. The data from the past earthquakes also show that most of the live rescues were conducted by the inhabitants. In the 1988 Armenia Earthquake, 95 per cent (Noji et al., 1990), and in the Hanshin–Awaji Earthquake in Japan, 97.5 per cent (according to the data by Japan Association for Fire Science and Engineering) were rescued by the families and neighbours, not including the local professional rescuers. The number of live rescues conducted by international teams has been very low.

International SAR Advisory Group (INSARAG) was established in 1991 from the lessons of the 1988 Armenia earthquake. The purpose of INSARAG is to make emergency preparedness and response more effective and to save more lives (DHA, 1991). This has been done by developing common procedures such as the INSARAG Guidelines and organising meetings and joint exercises. Since 2005, INSARAG has started its unique classification system, INSARAG External Classification (IEC), to further strengthen team capabilities and coordination in the field and provide affected countries with the list of qualified international SAR teams. INSARAG’s focus is on urban search and rescue (USAR) activities which are mainly needed after earthquakes in urban areas. This paper will also focus on international USAR activities.

In response to the 2010 Haiti Earthquake, 8 out of the 16 IEC-classified teams at that time were deployed. The after-action review (AAR) meeting, organised by INSARAG, evaluated the IEC-classified teams deployed to Haiti as they demonstrated professionalism and made a genuine difference during the response (OCHA, 2010). Based on this, the INSARAG Hyogo Declaration, where INSARAG requested all the internationally deployed teams to go through the IEC process and the affected countries to prioritise IEC-classified teams, was agreed at the INSARAG Global Meeting in September 2010 (IGM, 2010). However, the AAR meeting organised by INSARAG was a self-evaluation, and thus it critically and objectively evaluating the activities of the IEC-classified teams cannot be opined.

After the 2015 Nepal earthquake, Mr Rameshwor Dangal, the then Joint Secretary, Ministry of Home Affairs of the Nepalese Government, who was in charge of the reception of international SAR teams, mentioned that only IEC-classified teams should be allowed to enter the country in future (IGM, 2015). While the IEC-classified teams were highly evaluated, there has been no detailed study on how the IEC-classified teams made a difference compared to the non-classified teams in the field.

To fill this gap, this paper will analyse the effects of IEC by reviewing their responses in the Nepal earthquake. It will examine the past studies on the reasons why it is difficult for international SAR teams to save lives and identify the current bottlenecks. It will then analyse if IEC successfully addresses the identified bottlenecks by reviewing the Nepal response.

### Literature review

Some studies have been conducted regarding the reasons why it is difficult for international SAR teams to save lives. Their reasons are mainly divided into the three categories: timing of

<table>
<thead>
<tr>
<th>Year</th>
<th>Earthquakes</th>
<th>Number of deployed international SAR teams</th>
<th>Number of live victims rescued by international SAR teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Sichuan earthquake (China)</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>Padang earthquake (Indonesia)</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>Christchurch earthquake (New Zealand)</td>
<td>8</td>
<td>1 (by Australia)</td>
</tr>
<tr>
<td>2011</td>
<td>Great East Japan earthquake</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>2015</td>
<td>Nepal earthquake</td>
<td>76</td>
<td>16 (11 by India)</td>
</tr>
</tbody>
</table>

**Sources:** Created by the authors based on JICA (2009, 2011), McLean et al. (2012), Moore (2011), OCHA (2011, 2015a)
arrival in the affected areas is too late, international SAR teams lack the adequate capacity to save lives and bad coordination among them and with the affected countries.

Since the 1980s where international SAR teams have started to be deployed across state borders, it has been pointed out that they arrived in the affected areas too late. Bruycker et al. (1983) conducted the detailed research on the relationship between the timing of the rescue and the possibility of survival of the trapped people in the South Italy Earthquake in 1980. Based on the fact that most of the survivors were rescued within the first 48 h, it suggested that SAR activities be started within 24 h after earthquakes. Noji et al. (1990) also reiterated the importance of starting SAR activities as soon as possible based on the statistics in the 1988 Armenia earthquake. In the Armenia earthquake, the 89 per cent of the live rescue operations were conducted by the local people within 24 h without using heavy equipment. On the other hand, the international SAR teams did not arrive in the first 24 h.

Next, international SAR teams cannot save lives if they do not possess adequate SAR techniques and equipment to extricate and properly treat trapped people. Walker (1991) analysed the conditions where international SAR teams can contribute to saving lives. For them to save lives, they must have the skills and equipment to locate and extricate victims (e.g. cutting concretes) and provide immediate medical care, which is more than the first aid treatment. Also, Walker argues that, even if international SAR teams possess the robust SAR skills and arrive in affected areas quickly, they are useful only in affected areas where multi-storied buildings have collapsed leaving voids inside them. This is the reason why international SAR teams usually operate in urban areas.

Finally, Nishikawa (1996) points out that lack of coordination among international SAR teams, and with affected countries, can hinder smooth SAR operations in the field. He provides the two examples of bad coordination. In the 1988 Armenia earthquake, the International SAR teams from the European countries rushed to Armenia and conducted their activities without coordinating with the local emergency authorities. This led to confusion, and they became an additional burden for the affected country. This lesson later led to the creation of INSARAG (DHA, 1991). In the 1995 Great Hanshin–Awaji Earthquake in Japan, although there was no request for foreign SAR assistance from the local authorities, the central government decided to accept them from diplomatic consideration.

From the literature review, it becomes clear that international SAR teams can contribute more to saving lives by arriving in affected areas earlier (right timing), improving their SAR capabilities (right capacity) and strengthening coordination mechanism (right coordination). In the following sections, this paper will analyse if IEC successfully addresses these bottlenecks and contributes to saving lives.

Methodology
This paper conducts a case study of the 2015 Nepal earthquake. When the Nepal earthquake happened, ten years have passed since the introduction of IEC, and the main assisting countries already had the IEC-classified teams. At the same time, the awareness of IEC among the receiving countries was also increasing. For example, the Nepalese Government hosted the INSARAG AP regional exercise in 2009, and some government officials were aware of INSARAG and IEC (Okita and Katsube, 2016). Furthermore, among the earthquakes listed in Table I, the Nepal earthquake received more international SAR teams compared to the other earthquakes. Thus, the Nepal earthquake should be the most appropriate case to analyse the effects of IEC in the actual disaster response.

To evaluate the activities of the international SAR teams, the individual cases should be carefully observed. For example, the SAR capability cannot be judged just by looking at the numbers of live victims rescued. It highly depends on the location assigned to the teams by the affected country or the coordination mechanism supported by the Office for the Coordination of Humanitarian Affairs (OCHA). The time to reach the affected area is
also subject to the elements of the affected country (e.g. landing permission). As this paper will later introduce, some teams successfully saved lives while they rushed to the sites without contributing to the coordination mechanism. That is the reason why this paper adopts a case study.

INSARAG divides the world into the three regions: AP, Americas and Africa–Europe–Middle East (AEME), and holds regional meetings and exercises in each regional group. This paper will mainly look at the response by the teams deployed from the AP region as Nepal is also part of the AP region. Table II shows the list of the IEC-classified teams in the AP region as of the Nepal earthquake. In IEC, teams are categorised into heavy or medium level based on their scale and capabilities. For example, heavy teams must be able to conduct a 24-h operation for 10 days while medium teams can operate for seven days. The standard number of the team members for heavy team is 59 while it is 40 for medium team (INSARAG, 2015).

As for the data collection, in addition to the data collected and released by OCHA and the United Nations Disaster Assessment and Coordination (UNDAC) team deployed to the Nepal earthquake, the data were collected in the field during the emergency phase by the author who was deployed as part of the UNDAC team and acted as the Reception/Departure Centre (RDC) manager from 26 April to 7 May. The role of the RDC, which was established at the Kathmandu airport, was to register all the incoming international teams and provide an initial briefing to them (Okita and Katsube, 2016). Furthermore, the authors conducted interviews with the deployed international SAR teams and the INSARAG secretariat. The interviewees were selected from the representatives of each team who attended the INSARAG-related events and thus had a good understanding of the team management and the INSARAG methodologies.

This paper will focus on the USAR operations in the urban area in Kathmandu city. Although the Nepal earthquake has severely affected the rural areas such as Gorkha and Sindhupalchok, the international SAR teams mainly conducted their operations in Kathmandu city and the surrounding area (OCHA, 2015a). Thus, the limitation of this study is that the findings can only apply to international SAR activity in an urban area, or USAR, but not to the other types of SAR activity such as mountain rescue.

IEC and its checklist
IEC has been implemented since 2005, and as of the end of 2018, 53 teams have been classified and maintains their classification level. The classified teams must be re-classified every five years to maintain the validity of IEC. This is called INSARAG External Reclassification (IER). To be classified in IEC/R, international SAR teams must satisfy all the items, which are about 140, listed in the IEC/R Checklist developed by INSARAG. Table III shows the major items in the IEC/R Checklist version 2018 that address the issues of timing, capacity and coordination.

<table>
<thead>
<tr>
<th>Team and country</th>
<th>Year classified in IEC</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore Civil Defence Force (SCDF), Singapore</td>
<td>2008</td>
<td>Heavy</td>
</tr>
<tr>
<td>Queensland (QLD) Fire and Rescue, Australia</td>
<td>2008</td>
<td>Heavy</td>
</tr>
<tr>
<td>China International Search and Rescue (CISAR), China</td>
<td>2009</td>
<td>Heavy</td>
</tr>
<tr>
<td>Japan Disaster relief team (JDR), Japan</td>
<td>2010</td>
<td>Heavy</td>
</tr>
<tr>
<td>Korea Disaster Relief Team (KDRT), South Korea</td>
<td>2011</td>
<td>Heavy</td>
</tr>
<tr>
<td>New South Wales (NSW) Fire and Rescue, Australia</td>
<td>2012</td>
<td>Heavy</td>
</tr>
<tr>
<td>New Zealand Fire Service (NZFS), New Zealand</td>
<td>2015</td>
<td>Heavy</td>
</tr>
</tbody>
</table>

Source: Created by the authors based on the INSARAG website (www.insarag.org/iec)
According to the IEC/R Checklist, the IEC-classified teams, not only focusing on their SAR activities, must support the coordination activities led by OCHA and UNDAC. A USAR Coordination Cell (UCC), which is part of On-Site Operations Coordination Centre (OSOCC) run by UNDAC, is a function to coordinate international SAR teams. IEC-classified teams are requested to provide support staff to RDC and UCC as part of their responsibility. Also, the IEC-classified teams are requested to contribute as Sector Coordinator (SC) or to Sector Coordination Cell (SCC), which is also part of the UCC functions.

The coordination among the international teams starts immediately after major earthquakes occur. OCHA manages the website called virtual OSOCC (VO)[1] for information sharing among the disaster response officers in the world. To be classified in IEC/R, teams must have the ability to access and upload information on VO.

The IEC-classified teams’ response to the 2015 Nepal earthquake
The Nepal earthquake occurred at 11:56 (local time) on 25 April 2015. The epicentre was southwest part of Nepal, and the magnitude was 7.8. In response to this earthquake, 76 international SAR teams from 33 countries were deployed (OCHA, 2015a). This chapter will analyse how the IEC-classified teams responded to the earthquake, and how they made a difference from the non-classified teams. It will focus on the three criteria discussed above: timing, capacity and coordination.

Right timing
Table IV shows the number of the arrived international SAR teams at the Kathmandu airport by date, divided by IEC-classified and non-classified teams. The four teams have arrived before the setting-up of the RDC by the UNDAC on 26 April. They were India (non-classified) on 25 April, CISAR of China and AFAD of Turkey (both are IEC-classified) and GEA of Turkey (non-classified) on 26 April.

As the background information, in the night of 27 April, the Nepalese Government requested international SAR teams to stand down if they were still in their home countries. This message was conveyed by the OCHA staff in Geneva through the VO website.
On 3 May, the Nepalese Government declared the end of international SAR phase, and requested all the international SAR teams in Nepal to demobilise, meaning that they should come back to their home countries. By 8 May, most of the teams departed from Nepal (OCHA, 2015c).

From Table IV, it cannot be said that the IEC-classified teams necessarily arrived earlier than the non-classified teams. The IEC-classified teams that entered Nepal within 24 h were only two teams: CISAR and AFAD. CISAR arrived at the Kathmandu airport at 09:45 on 26 April, whereas the other three IEC-classified teams deployed from the AP regions took more than 48 h to get in. They registered at the RDC at 14:00 (JDR), 14:30 (KDRT) and 16:00 (SCDF) on 28 April, respectively. The main reason for the delay was that they could not get landing permission because of the congestion in the Kathmandu airport. For example, Japan’s IEC-classified team, JDR, left Japan on 26 April, and tried to fly to Kathmandu via Bangkok on 27 April. Because of the congestion, however, their flight was diverted to Calcutta, and they had to come back to Bangkok again. They finally arrived in Kathmandu on 28 April (Okita and Katsube, 2016).

On the other hand, it should be noted that not many IEC-classified teams arrived after 29 April. One of the reasons for this should be that some IEC-classified teams cancelled their deployments based on the stand-down message issued on 27 April. The IEC-classified team from New Zealand, NZFS, can be a good example of this. According to the staff of NZFS who was supposed to be part of the team being deployed to Nepal, the New Zealand Government and NZFS were preparing for the possible deployment immediately after the earthquake, and were waiting for their departure at the airport. However, the stand-down message by the Nepalese Government was released on VO. Based on this information, they cancelled the deployment.

Table IV shows that many non-classified teams kept on arriving even after 29 April. One possible reason for this should be that these non-classified teams did not have access to VO, and thus did not get the stand-down message. In this sense, the IEC-classified teams generally followed the instruction from the affected country compared to the non-classified ones although it must also be noted that the two IEC-classified teams arrived after 1 May.

### Right capacity

As of the Nepal earthquake, 42 teams have been already classified in IEC (33 teams in AEME region, seven in AP and two in Americas). Among the 42 teams, only the 18 IEC-classified teams responded to the Nepal earthquake. Looking at the AP region, four out of the seven IEC-classified teams, except the two Australian and the one New Zealander teams, were deployed (OCHA, 2015b). Notably, many IEC-classified teams were in Europe, but among the 33 IEC-classified teams in the AEME region, only 12 teams responded.

Australia had two IEC-classified teams when the Nepal earthquake happened, Fire and Rescue Services of Queensland (QLD) and New South Wales (NSW), and neither of them
were deployed. According to the staff of the QLD team\[4\], they were preparing for the possible deployment as normally, and have been in touch with the Department of Foreign Affairs and Trade (DFAT) in Canberra. However, the approval from Canberra never came, and the reason was not notified to the team. By the time they received the decision of not being deployed, there were sufficient SAR teams already on the ground. The approval might take longer time than usual, according to the interviewee, because of the department restructure (AusAID became part of DFAT in 2013, and the Nepal earthquake was the first deployment after the restructure).

Also, the INSARAG Team Leaders (ITL) meeting 2015, which mainly discussed the Nepal response, expresses its concern that some IEC-classified teams responded not as their classification level (ITL, 2015). Table V summarises the team composition of the 18 IEC-classified teams deployed to the Nepal earthquake. It shows that the five teams as underlined in Table V were deployed below their classification level. These examples show that, although there are more than 50 IEC-classified teams as of today, it does not mean that all of them are mobilised and are deployed with their full capabilities.

In the Nepal earthquake, many non-classified teams were also deployed. Did these non-classified teams contribute to live rescues in the Nepal earthquake? Table VI shows the list of the 16 live rescues conducted by the international SAR teams.

The neighbouring country, India, sent large teams with 720 personnel (45 personnel/team times 16 teams), and the first Indian team arrived at the Kathmandu airport within 6 h of the earthquake (Katoch, 2015; OCHA, 2015a, b). Although they were non-classified teams, they successfully rescued 11 live victims. Except for India, the international SAR teams saved five live victims, and four out of five were rescued by the IEC-classified teams, or in collaboration with them. A Turkish non-classified team, GEA, arrived in Kathmandu at 11:15 on 26 April, and saved one live victim. With support from the Nepalese Army, they rushed to the site with possible live victims just after their arrival at the airport. GEA was a small team, with only 13 personnel and no search dogs, but one of the reasons for their successful live rescue should be their early arrival at the site.

<table>
<thead>
<tr>
<th>Team</th>
<th>IEC classification level</th>
<th>Personnel</th>
<th>Dog</th>
<th>Actual deployment level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia (EMERCOM)</td>
<td>Heavy</td>
<td>87</td>
<td>7</td>
<td>Heavy</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>Heavy</td>
<td>87</td>
<td>6</td>
<td>Heavy</td>
</tr>
<tr>
<td>Poland</td>
<td>Heavy</td>
<td>81</td>
<td>12</td>
<td>Heavy</td>
</tr>
<tr>
<td>Japan (JDR)</td>
<td>Heavy</td>
<td>71</td>
<td>4</td>
<td>Heavy</td>
</tr>
<tr>
<td>Singapore (SCDF)</td>
<td>Heavy</td>
<td>69</td>
<td>4</td>
<td>Heavy</td>
</tr>
<tr>
<td>China (CISAR)</td>
<td>Heavy</td>
<td>62</td>
<td>6</td>
<td>Heavy</td>
</tr>
<tr>
<td>The Netherlands (USAR NL)</td>
<td>Heavy</td>
<td>62</td>
<td>8</td>
<td>Heavy</td>
</tr>
<tr>
<td>Germany (ISAR Germany)</td>
<td>Medium</td>
<td>58</td>
<td>7</td>
<td>Heavy</td>
</tr>
<tr>
<td>The USA (Fairfax County)</td>
<td>Heavy</td>
<td>57</td>
<td>6</td>
<td>Heavy</td>
</tr>
<tr>
<td>The USA (LA County)</td>
<td>Heavy</td>
<td>57</td>
<td>6</td>
<td>Heavy</td>
</tr>
<tr>
<td>Belgium (B-FAST)</td>
<td>Medium</td>
<td>44</td>
<td>2</td>
<td>Medium</td>
</tr>
<tr>
<td>Turkey (AFAD Istanbul)</td>
<td>Medium</td>
<td>36</td>
<td>2</td>
<td>Medium</td>
</tr>
<tr>
<td>Norway (NORSAR)</td>
<td>Medium</td>
<td>35</td>
<td>5</td>
<td>Medium</td>
</tr>
<tr>
<td>UK (UK ISAR)</td>
<td>Heavy</td>
<td>26</td>
<td>0</td>
<td>Light</td>
</tr>
<tr>
<td>Oman</td>
<td>Medium</td>
<td>20</td>
<td>0</td>
<td>Light</td>
</tr>
<tr>
<td>Turkey (AKUT)</td>
<td>Medium</td>
<td>20</td>
<td>0</td>
<td>Light</td>
</tr>
<tr>
<td>France (PUI)</td>
<td>Medium</td>
<td>15</td>
<td>6</td>
<td>Light</td>
</tr>
<tr>
<td>Korea (KDR)</td>
<td>Heavy</td>
<td>15</td>
<td>2</td>
<td>Light</td>
</tr>
</tbody>
</table>

Note: "Dog" in the table means the number of search dogs
Source: Created by the authors based on OCHA (2015b) and the INSARAG website

Table V. IEC-classified teams deployed to the Nepal earthquake and their team composition
It is worth noting that some survivors were rescued by the international SAR teams even after three days of the earthquake. However, the rescue operations after day three also show that SAR teams must have adequate SAR techniques and logistics capabilities as required in the IEC/R Checklist. For example, the rescue operation which was done by CISAR and GEA took more than 13 h. It must be difficult to conduct this operation if they do not possess the strong logistical capability, including redundancy of team members. About the SAR capabilities, the operation conducted by the USA shows that they provided confined space medicine (CSM), and the Norwegian team found the live victim by search dogs.

**Table VI.**
Live rescue operations by the international SAR teams in the Nepal earthquake

<table>
<thead>
<tr>
<th>Team</th>
<th>IEC level</th>
<th>Live victims and when they were rescued</th>
<th>Live rescue operation (building type, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India (CISAR)</td>
<td>Non-classified</td>
<td>11 live victims on 25 April</td>
<td>Arrived on 25 April with 720 team members</td>
</tr>
<tr>
<td>China (CISAR)</td>
<td>Heavy</td>
<td>16-old male on 26 April</td>
<td>6-story building</td>
</tr>
<tr>
<td>Turkey (GEA)</td>
<td>Non-classified</td>
<td>22-old male on 27 April</td>
<td>Arrived at the site at 11:08 and rescued at 15:43</td>
</tr>
<tr>
<td>China (CISAR)</td>
<td>Heavy</td>
<td>21-old male on 28 April</td>
<td>3rd floor of 5-story building, Rescued around 3 a.m. on 27 April after 3-hour operation</td>
</tr>
<tr>
<td>Turkey (GEA)</td>
<td>Non-classified</td>
<td></td>
<td>1st floor of 7-story building, Found around 1 PM on 27 April, and rescued around 2 a.m. on 28 April</td>
</tr>
<tr>
<td>USA</td>
<td>Heavy</td>
<td>15-old male on 30 April</td>
<td>7-story building. Rescued from 2-meter rubble while providing CSM</td>
</tr>
<tr>
<td>Norway</td>
<td>Medium</td>
<td>24-old female on 30 April</td>
<td>1st floor of 7-story building, Found by search dogs. Rescued after 8-hour operation</td>
</tr>
<tr>
<td>Israel</td>
<td>Non-classified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>Non-classified</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Created by the authors based on OCHA (2015a), The Guardian (2015), Pokharel (2015), and the interviews with the staff of CISAR along with the reports submitted by CISAR and GEA.

**Right coordination**

As shown in Table III, the IEC-classified teams are required to contribute to the coordination mechanism as part of their responsibility. While UNDAC is tasked to set up an RDC at an arrival airport, the first-arriving IEC-classified team must set up an RDC and start coordination of international SAR teams if they arrive before UNDAC team members.

In the Nepal earthquake, the UNDAC team member who arrived on 26 April set up the RDC at the Kathmandu airport (Okita and Katsube, 2016). Two IEC-classified teams, CISAR and AFAD, actually arrived before the UNDAC, but they did not set up an RDC and left the airport (OCHA, 2015c). The INSARAG Secretariat later interviewed with CISAR, and according to them, when they arrived at the Kathmandu airport, the Nepalese Army supported offloading the equipment and rushed them to the site where live victims were trapped. Furthermore, CISAR had a very limited number of English-speaking members, and it was extremely difficult for them to leave the English-speaking members at the airport for the RDC operations. CISAR was re-classified in their IER in August 2014, and they performed the RDC and UCC operations during the simulation exercise by English-speaking members. While CISAR for sure had some English-speaking members, they did not bring them to Nepal for some reasons. As described in the right capacity section, this shows that some IEC-classified teams are not necessarily deployed with their full capabilities. This is not limited to the number of rescuers but staff who contributes to the coordination mechanism.

The UNDAC report says that the RDC and the UCC got support from some IEC-classified teams, but the timing of their support was late. After the establishment of the RDC by the UNDAC, USAR NL of the Netherlands arrived in the morning of 27 April. USAR NL left one
member at the airport to support the RDC, and took the lead in the UCC operations together with the already arrived UNDAC members (OCHA, 2015c; Okita and Katsube, 2016). In other words, until the arrival of USAR NL on 27 April, there was no support to the RDC and the UCC from the IEC-classified teams. The UCC was finally set up and running on 28 April, which was three days after the earthquake. According to David Norlin, the former Chairperson of the INSARAG Operations Working Group, who supported the UCC operations, in addition to the support staff from the USAR NL, four staff from the US teams were provided for the UCC on 29 April. Japan (JDR) provided one staff member on 1 May followed by one staff member from China (CISAR) on 2 May (Norlin, 2015). This shows that, although the RDC and the UCC got support from the IEC-classified teams, this support was rarely provided in the first 72 h after the earthquake, which was the most important phase regarding live rescue operations and SAR teams’ allocation.

The immediate information on the needs of the affected country, which can be used for decision-making by assisting countries, was not widely shared. According to Schmidt (2015), who did the basic survey for the 2015 ITL meeting where the Nepal response was discussed, some teams decided not to respond considering the low SAR needs in the field, but some other teams responded due to political reasons and/or media pressure rather than actual information on the SAR needs from the affected country (Schmidt, 2015).

Thanks to the development of information technology including the launch of VO in 1998, teams can now access to information on damage and needs immediately after earthquakes. However, the Nepal response shows the limitation of this. While the system such as VO was in place, the affected country might not be aware of it, or might not be able to use it. To reinforce this point, the gap between demand and supply was pointed out by OCHA in its AAR of the use of VO. While the number of users of VO was huge, the number of information providers, especially from the affected country, was limited (OCHA, 2016). The official stand-down message issued on 27 April by the government was also reported by news media, but the news of the successful live rescue on 30 April might give a stronger impression to overseas SAR teams that they were still needed (IRIN, 2015).

Findings and recommendations
This paper analysed how the IEC-classified teams responded to the Nepal earthquake and how they made a difference from the non-classified teams regarding timing, capacity and coordination.

Regarding timing, it cannot be said that the IEC-classified teams arrived earlier than the non-classified teams. However, this was mainly caused by the fact that the affected country did not prioritise the IEC-classified teams. Thus, it is rather the affected countries’ decision which teams can enter the affected country quickly. Regarding capacity, the non-classified teams could also contribute to saving lives if they arrived very early. Some live rescues were conducted after the day three of the earthquake, but it also showed that the SAR activities in this phase were difficult ones, requiring the SAR teams to have the robust capability as described in the IEC/R Checklist. In other words, non-classified teams, or the IEC-classified teams but deployed with less capability, will not be able to contribute to live rescue activities if they cannot arrive in the first three days. It is also worth noting that more than half of the IEC-classified teams in Europe were not deployed. The coordination mechanism, such as RDC and UCC, was mainly taken care of by the IEC-classified teams although there were some issues to be solved, and the non-classified teams rarely contributed to it. Finally, almost all the international SAR teams, both classified and non-classified, stayed in Kathmandu, and thus, the rescue activities in the mountainous areas were mainly conducted by the local resources.

Based on the above findings, this paper recommends the following. First, INSARAG and IEC have targeted the developed countries that send international SAR teams. However, the Nepal response shows that the awareness in the developing countries, which tend to be recipient
countries, is also important so that IEC as a system fully works. INSARAG has been trying to involve the earthquake-prone countries in its activity. Hosting the INSARAG-related events can enhance the awareness of INSARAG and IEC. When SAR teams go for IEC, they have opportunities to observe the IECs in other countries, and get advice from other IEC-classified teams as their mentor. These interchanges will also facilitate the understanding of IEC and other teams and will benefit when they have to receive international SAR assistance.

Second, the Nepal response reaffirms that timing of the rescue is the important factor for successful live rescue as the neighbouring and first-arriving country, India, conducted 11 out of the 16 live rescues by the international teams. As time passes, however, it becomes difficult for non-classified teams to save lives, and the Nepal response shows that they do not contribute to the coordination. Thus, to improve the efficiency of SAR activities, IEC-classified teams in the neighbouring countries should preferentially enter the country and start both SAR and coordination activities immediately. Currently, the AP region has eight IEC-classified teams as a Malaysian team was classified in 2016, among the total 53 classified teams in the world. Many IEC-classified teams are based in Europe, but more than half of them were not deployed to the Nepal earthquake. The possible reasons should be the long distance between Europe and Asia. Considering the high risk of earthquakes, the AP region should have more IEC-classified teams so that the IEC-classified teams in the region can quickly respond to the earthquakes in the region.

To facilitate smooth and quick deployment of SAR teams from the neighbouring countries, the regional or bilateral agreement on emergency response can be a possible option. The South Asian Association for Regional Cooperation, where both India and Nepal are member states, has signed the regional agreement on a rapid response to disasters in 2011 and India has played a leading role in implementing the agreement (Economic Times, 2015). Katoch (2015) points out that having country knowledge and personal relationship is important in providing smooth assistance. India and Nepal have shared the same culture, language, religion and have an open border: the Indian citizens do not need to bring their passports to cross the border, but only identity cards such as driving license required. Furthermore, Nepal citizens are allowed to serve in the Indian Army. This shows the trust and faith that India has on Nepalese citizens (Deshpande, 2017). It should be fair to say that the emotional bonds based on these backgrounds made the Indian Government respond to the Nepal earthquake as if it was an earthquake in India.

Third, the Nepal response shows that most of the international SAR teams stayed in the urban Kathmandu area and did not operate in the mountainous areas. On the other hand, the local resources in Nepal could immediately start SAR activity as first responders. This reiterates the needs of strengthening the local SAR actors and the national capacity in Nepal despite the influx of foreign SAR teams, and this can apply to other countries as well. At this stage, IEC is only for the internationally deployed teams, but INSARAG should put more focus on strengthening national capabilities of developing and earthquake-prone countries through the IEC process. A study demonstrates that IEC has also contributed to strengthening domestic capabilities by introducing new SAR techniques in Japan (Okita et al., 2018). INSARAG can facilitate the process of strengthening domestic teams by strategically having IEC-classified teams in earthquake-prone countries.

**Conclusion**

This paper reviewed if the IEC-classified teams made a difference in the Nepal earthquake compared to the non-classified teams regarding the three bottlenecks of international SAR activity: timing, capacity and coordination. It clarified how these bottlenecks were caused and showed that the issues could not be solved by the efforts of assisting teams only. For IEC as a system to fully work and to save more lives, the involvement of earthquake-prone and receiving countries is necessary.
Based on the lessons of the Nepal earthquake, this paper recommended raising awareness of IEC in the earthquake-prone countries; maintaining a balanced number of IEC-classified teams in each region and fostering the regional cooperation, especially in the earthquake-prone areas such as Asia; and strengthening national response capabilities through the IEC process, in order for INSARAG to contribute to saving more lives.

For future studies, the effects on national SAR capability by having an IEC-classified team in a country should be further explored. If national and local SAR capability can be improved by strengthening an internationally deployed team through the IEC process, it makes sense to facilitate the teams in earthquake-prone countries and non-traditional donors, such as Indonesia and the Philippines, to go for IEC.

Notes
1. https://vosocc.unocha.org/
2. The interview was conducted through e-mails, which were exchanged on 16 March 2018.
3. OCHA (2015b) does not count the IEC-classified team arrived on 4 May as a SAR team, and thus the number of IEC-classified teams here (18 teams) and the one in Table I (19 teams) does not match.
4. The interviews with the staff of QLD and NSW teams were conducted through e-mails, which were exchanged from 16 March to 3 April 2018.

References


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An evidence-based urban DRR strategy for informal settlements

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Abstract

Purpose – The purpose of this paper is to analyze the evidence-based research strategy (EBRS) used to evaluate eight projects that applied the neighborhood approach for disaster risk reduction (NA-DRR) in informal urban settlements in Colombia, Guatemala, Haiti, Honduras, Jamaica and Peru, between 2012 and 2017.

Design/methodology/approach – The study covers the first five of the seven EBRS stages: first, identify relevant interventions; second, prepare evaluation questions; third, select evidence sources and implement a search strategy; fourth, appraise evidences and identify gaps; fifth, create an evaluation design to include an extensive literature review, followed by a mixed research method with surveys, focus groups and interviews; disaster risk modeling; georeferencing analysis; and engineering inspections. The last two stages: sixth, apply the evidence, and seventh, evaluate the evidence application, will be addressed in a near future.

Findings – Even though the reference to “evidence” is frequent in the DRR field, it is largely based on descriptive processes, anecdotal references, best practices, lessons learned and case studies, and particularly deficient on the subject of informal and precariousness settlements. The evaluation allowed a deep and broad analysis of NA-DRR in urban informal settlements, comparing it with other DRR strategies implemented by different stakeholders in fragile urban settings, assessing the effectiveness and sustainability of the various DRR interventions.

Originality/value – The abundant data, information and knowledge generated will serve as foundation for forthcoming thematic peer-reviewed publications informing evidence-based DRR research, policy and practice, with emphasis on informal and precariousness settlements in particular.

Keywords Evidence-based, Disaster risk reduction, Informal settlements, Urban risk, Precariousness, Latin America and the Caribbean

Paper type Research paper

1. Introduction

Given the abundance of articles, texts and guidelines on disaster risk reduction (DRR) in the literature, one wonders if there has been a rational, rigorous and systematic process to evaluate the effectiveness of DRR practice at all. The profusion of practitioner-driven...
literature alludes perhaps to an eagerness on the part of the authors to attract the attention of an audience thirsty for DRR knowledge.

Clearly, there are some serious challenges in our understanding of DRR practice effectiveness: an overconfidence in lessons learned and good practices, an unmistakable distancing between the DRR community and the academia, in addition to the common limitations in the available DRR literature. The DRR community has seen the need to respond to an increasing risk construction process without systematically embracing a rigorous evaluation of DRR interventions for design, effectiveness, efficiency and sustainability. Academia, too, has lagged behind; it has not been proactive in proposing, designing and implementing evaluation processes for DRR interventions that respond to the needs, times and priorities of the DRR community. In this paper we propose the adoption of the evidence-based (EB) approach to assess DRR practices. Kvernbekk (2011, p. 532) explains evidence as the degree of effectiveness of strategies or interventions, or, “the truth-value of our claims about such effectiveness” and that its function is to support, confirm or disconfirm, a hypothesis or theory. As Tellings (2017, p. 584) explains, “evidence” is not the same as “proof.” The “Grades of Recommendation, Assessment, Development, and Evaluation” offers five major areas or domains to assess the quality of evidence proposed in the literature: issues with the study design or execution, inconsistency of results, indirectness of evidence, imprecision of results and publication bias (Pandis et al., 2015).

This study is structured in four major sections: after the introduction, Section 2 addresses the concepts of EB practice, EB research and EB and DRR. Section 3 on the EB strategy applied to the existing urban DRR practices in densely populated informal urban settlements in the Latin American and Caribbean (LAC) region, includes research objectives and questions, theoretical framework, evaluation design, findings and limitations. Finally, Section 4 contains the conclusions.

2. Evidence-based concept

The term EB was first reported in the 1980s (Rosenberg and Donald, 1995), but it was not until 1992 when the Evidence-Based Medicine Working Group published an article about EB and medical education in the Journal of the American Medical Association (Montori and Guyatt, 2008; Rahman and Applebaum, 2011). The initial emphasis was given to EB practice and research in medicine. The last two decades have seen an increase in EB trends and initiatives beyond medicine in areas such as nursing psychology, social work, education, policy, management and decision making. Each field adopted the same principles while developing their own approaches. For the purposes of this study, we will focus on EB practice and EB research from the social sciences perspective and apply it to DRR.

Evidence-based practice

The evidence-based practice (EBP) is understood as “the conscientious, explicit, and judicious use of current best evidence in making decisions about individual patients” (Sackett et al., 1996, p. 71). In the case of DRR, the practice has largely preceded academic and research discussions. DRR “is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development” (United Nations, 2016, p. 16). In almost four decades, the field has evolved from a purely reactive approach, initially dominated by disaster response and recovery, to an anticipatory or preparedness mode. This was followed by a corrective risk management strategy which sought to work on a built environment to reduce risk construction and mitigate disaster impacts, and has finally reached a prospective strategy that seeks a future model of safe and sustainable development. Aware of the intricate and complicated problem, the functional concept of resilience has been introduced in the past two decades in the development community,
understanding it as “the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth” (USAID, 2012, p. 5). As a result of this complexity in DRR practices, we found multiple disciplines and stakeholders intervening in DRR. However, we observed a poor systematization of processes and outputs, as well as deficient evaluation of the effectiveness and sustainability of the outcomes obtained.

As Tellings (2017, p. 582) indicates, “[EBP] is based on the view that the best possible way to guarantee that something works is to scientifically prove that it works […] [EBP] is seen as a foundational principle for professionals to continue to learn and maintain theoretical and practical competencies throughout their careers.” Hence, the EBP becomes a useful strategy for disaster risk management (DRM), allowing us to validate the effectiveness and sustainability of many of the current practices, with a strong focus on aspects of learning and capacity development.

**Evidence-based research**

Evidence-based research (EBR) is defined as “the use of prior research in a systematic and transparent way to inform a new study so that it is answering questions that matter in a valid, efficient and accessible manner” (Robinson, 2009). A fundamental EBR principle indicates that studies should be based on practice and real interventions, allowing active participation of implementing practitioners in defining the objectives and research questions.

The systematic review constitutes a critical tool for EBR, which can be used to plan, implement and evaluate the practice, to prepare and review hypotheses and research evidence, as well as guide future research. During the 1990s and early 2000s, DRR studies most often displayed analytical superficiality, remained descriptive at best, and did not reach the level of theoretical, indicative or causal analysis (Schlosser, 2006). Authors such as Kazdin (2008) considered it critical to move beyond the association between an intervention and its outcome, looking for ways to acquire knowledge about causation, context and assumptions as it led to understanding pathways to change (theory of change), identifying moderating variables and stressing the importance and utility of qualitative research. Interestingly, the descriptive DRR studies remain the norm today.

**Evidence-based and DRR**

In a careful review of the existing DRR EB literature, the first step was identifying a list of databases (both scientific and gray) and relevant websites to find articles and publications about DRR research and practice experiences that have used an EB approach. The databases selected were: Google Scholar, Scopus, World of Science and PreventionWeb; Google search engine was used to look for other relevant websites. The second step entailed the definition of inclusion search criteria, screening titles and abstracts with the terms (DRR) or related words such as (risk reduction/disaster resilience), along with the topic of interest (EB) and related words (approach/research/strategy/practice). Articles were excluded if: they were editorials, opinions or commentaries without any substantial evidence independent of the study design; the content was unrelated to the topics, not available on internet, or written in a language other than English (Table I).

We reviewed the webpages of a number of international organizations such as the United Nations Office for Disaster Risk Reduction, United Nations Development Program (UNDP), World Health Organization and UN-Habitat, and the reference lists (cross-referencing) of the articles judged to be relevant to the topic of interest.

In this study, we defined EB approach for DRR research and practice as a “process.” The selected documents were qualitatively assessed for a combination of research-and-practice experiences in which identifiable “questions” had initiated an EB research process,
and ideally, this process had also informed practice (i.e. in the form of manuals, guidelines, toolkits and the like).

The literature search identified 248 titles and abstracts, conducted a full-text review of 32 articles, selecting 8 articles for the evidence synthesis – systematic reviews which synthesize the results of multiple original studies. Figure 1 describes the flow of the literature review conducted.

A mixed deductive–inductive process and team discussions guided our selection of documents from the literature review search. Not constructing an EB study ourselves, we adapted the confidence in the evidence from reviews of qualitative research approach, instead of quality appraisal scores, to categorize each of the selected full-text articles according to its merit in reporting a process of EB DRR: formulation of questions to guide evidence reviews; systemic literature review and evidence synthesis; and DRR practice or intervention.

A number of articles urge introduction of EB policy or decision making, while others provide frameworks and recommendations to develop EB research in specific areas of disaster research, but none on DRR practices or interventions in particular. In some cases, EB actions, regulations and policies are discussed alongside new knowledge, technologies and policy frameworks. Others provide EB data without offering details about the processes that informed the research preparation, nor how these EB data informed practice. Some documents were guidelines and toolkits that apparently used an EB approach but they lacked references to the process or they do not use the “(EB)” term (or the like). A few cases had developed EB policies reviews in the past, but none were directly related to DRR.

Table I.

<table>
<thead>
<tr>
<th>Source</th>
<th>Search strategy</th>
</tr>
</thead>
</table>
A limited number of articles contain references to EB DRR concerning a systemic literature review, also called “(evidence-based evaluation).” At best, articles refer to the development of EB policies and practices for DRM but without going into the details of the processes.

3. The EB strategy applied to the existing urban DRR practices in densely populated informal urban settlements in the LAC region

The background
The United States Agency for International Development’s Office of US Foreign Disaster Assistance (USAID/OFDA)’s Neighborhood Approach for DRR (NA-DRR) programming is closely associated with the reconstruction process of the neighborhood of Ravine Pintade – “(KATYE)” project – in Port-au-Prince, Haiti, after the 2010 earthquake. This KATYE project was implemented by USAID/OFDA, international NGOs (CHF and PCI), and the residents, who agreed to clear the rubble, repair houses, construct transitional shelters, stabilize slopes, rehabilitate sanitation and drainage infrastructure and footpaths, and redesign public spaces for better safety, access and disaster risk mitigation. Key features for the project’s success were: extensive community engagement, a highly consultative planning process and a commitment to upgrade all aspects of the neighborhood for the common good, which helped residents re-establish their physical, economic and social structures. Principles similar to NA-DRR were used in two cases that preceded the Haiti experience: the 1999 Bamako, Mali, flash flooding response, and the 2006–2007 shelter-led project carried out in Kabul, Afghanistan, in response to the conflict situation (Sarmiento, Gelman, Herard and Bittner, 2017).
The NA-DRRs designed to find practical and workable solutions for DRR in densely populated informal urban settlements occupied by vulnerable and marginal communities (Sarmiento and Herard, 2015). Thus, the concept of NA-DRR has evolved as an integrated, multi-sectoral analytical framework that centers on the geographic confines of neighborhoods in order to address disaster risks in urban settings, through a participative planning process, and addresses four priority sectors: shelter and settlements; economic recovery and market systems; water, sanitation and hygiene; and natural and technological risks. The participatory process and framework flexibility of the NA-DRR allows it to adapt to each local context and incorporate the priority sectors as appropriate to the needs of the community (USAID/OFDA LAC, 2015).

Since 2012, USAID has been promoting the NA-DRR strategy in different LAC countries (see Table II) and many of the first iteration of projects have already concluded.

Statement of work
In 2017, USAID assigned the task of evaluating the effectiveness and sustainability of the NA-DRR programming in the LAC region to the authors. The goal of this evaluation was to improve USAID’s understanding of the performance and outcomes of the USAID funded urban programs that utilize the NA-DRR (USAID, 2017). The findings of this evaluation will inform future programming decisions and adjustments to ongoing USAID/OFDA urban DRR programming in the LAC region and globally. More broadly, the findings of the evaluation will add to the evidence base of the "(Neighborhood Approach)" as a DRR tool (Sarmiento et al., 2018).

The objectives and questions
Two objectives were defined for this performance evaluation: understanding the effectiveness and the sustainability of the NA-DRR. The statement of work defined a specific set of questions for each objective that informed the design and implementation of this evaluation. The complete text of the questions is included in the Findings section of this paper.

The evaluation included a third objective on the programming strategy itself, including the programming implementation, alliances and national counterparts.

The theoretical framework
The theoretical framework of NA-DRR was built on two pillars. The first, the disaster risk concept, understood as: “The potential loss of life, injury, or destroyed or damaged assets that could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity” (United Nations, 2016, p. 14). Blaikie et al. (1994) developed the “(Pressure and Release Model)” to reflect the complexity of the disaster risk concept, illustrating the process of risk creation, beginning with the root causes, followed by the dynamic pressures, expressed through unsafe conditions and resulting in risk generation that could materialize into disaster situations. The second pillar is represented by the high growth of urban informality and precariousness in recent decades, leading to the generation of slums or informal settlements. According to UN-Habitat III (2015, p. 1), informal settlements are “residential areas in which 1) inhabitants have no security of tenure vis-à-vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing; 2) the neighborhoods usually lack, or are cut off from, basic services and city infrastructure; and 3) the housing may not comply with current planning and building regulations, and is often situated in geographically and environmentally hazardous areas.” According to Sandoval and Sarmiento (2018), approximately 924m people lived in informal settlements or slums around the world in
<table>
<thead>
<tr>
<th>Country</th>
<th>City</th>
<th>Award no.</th>
<th>Implementing partner</th>
<th>Dates</th>
<th>NA area – hectares</th>
<th>NA built area – hectares</th>
<th>House's surface area sqm</th>
<th>Total households</th>
<th>Household members average</th>
<th>Total individuals</th>
<th>Population density people/hectare sqm per person</th>
<th>NA area – hectares</th>
<th>Budget</th>
</tr>
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<tbody>
<tr>
<td>Peru</td>
<td>Carabayllo</td>
<td>AID-OFDA-A-14-00024</td>
<td>Save the Children/US (SC)</td>
<td>October 1, 2014–September 30, 2017</td>
<td>53.4</td>
<td>42.6</td>
<td>127.5</td>
<td>3,338</td>
<td>5</td>
<td>15,623</td>
<td>293</td>
<td>53.4</td>
<td>$1,894,843</td>
</tr>
<tr>
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<td>Independencia</td>
<td>AID-OFDA-A-14-00025</td>
<td>PREDES</td>
<td>October 1, 2014–March 31, 2017</td>
<td>11.2</td>
<td>8.1</td>
<td>119.3</td>
<td>678</td>
<td>5</td>
<td>3,295</td>
<td>295</td>
<td>11.2</td>
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<td>Peru</td>
<td>Rimac</td>
<td>AID OFDA-A-14-00023</td>
<td>COOPI</td>
<td>September 15, 2014–September 14, 2017</td>
<td>48.5</td>
<td>44.8</td>
<td>106.3</td>
<td>4,214</td>
<td>5</td>
<td>20,987</td>
<td>433</td>
<td>48.5</td>
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<tr>
<td>Colombia</td>
<td>Medellin</td>
<td>AIDOFDA-A-12-00013</td>
<td>Project Concern International (PCI)</td>
<td>October 1, 2014–January 31, 2017</td>
<td>95.7</td>
<td>131.0</td>
<td>67.8</td>
<td>19,333</td>
<td>6</td>
<td>115,998</td>
<td>1,211</td>
<td>95.7</td>
<td>$1,708,726</td>
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<tr>
<td>Haiti</td>
<td>Port-de-Paix</td>
<td>APS-OFDA-A-14-00027</td>
<td>Habitat for Humanity (HHI)</td>
<td>September 6, 2012–March 31, 2014</td>
<td>46.4</td>
<td>14.1</td>
<td>122.9</td>
<td>419</td>
<td>7</td>
<td>2,780</td>
<td>337.14</td>
<td>14.1</td>
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<td>Jamaica</td>
<td>Portmore</td>
<td>AID-OFDA-A-13-00023</td>
<td>GOAL</td>
<td>September 23, 2013–December 23, 2016</td>
<td>110.4</td>
<td>104.3</td>
<td>75.3</td>
<td>13,854</td>
<td>7</td>
<td>62,068</td>
<td>100.8</td>
<td>59.3</td>
<td>$1,688,000</td>
</tr>
<tr>
<td>Honduras</td>
<td>Tegucigalpa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,377,444</td>
</tr>
</tbody>
</table>

**Table II.** Neighborhood approach projects assessed.
2001, representing 31.6 percent of the world’s urban population. The 2014 UN-Habitat (2016) report indicates that 104.8m now live in informal settlements in LAC (21.1 percent).

Building upon the two pillars described, we recognized specific unsafe conditions in the urban informal settlements under study to identify four resulting trajectories that form the pathways of influence through which action must be taken: secure land occupation; sufficient and resilient livelihoods; robust and resilient ecosystems; and adequate disaster risk and emergency management. In addition, it is important to address the issue of extreme poverty, which influences the secure land occupation and sufficient and resilient neighborhoods (Sarmiento et al., 2018).

The evaluation design

We defined seven stages for the EB strategy (EBS) of the evaluation methodology: (1) identify relevant interventions; (2) prepare evaluation questions; (3) select evidence sources and implement a search strategy; (4) appraise evidence and identify gaps; (5) create and implement evaluation design; (6) apply the evidence, and (7) evaluate the evidence application. The present study covers the first five EBS stages, beginning with the first two through the definition of two objectives and specific questions related to the effectiveness and the sustainability of the NA-DRR. For stages (3)–(5), the authors conducted an extensive literature review, followed by a mixed research method, including surveys, focus groups and interviews; disaster risk modeling; georeferencing analysis; and engineering inspections.

The research design incorporated several theoretical perspectives for research and state-of-the art technologies to address USAID’s evaluation questions on project effectiveness and sustainability. We defined units of measurement to build a comparable project baseline and assess and value the project outputs and outcomes. We began with an extensive literature review, followed by mixed research methods, including qualitative and quantitative approaches:

- literature review on DRR approaches and interventions implemented in the LAC region;
- seismic risk modeling for the eight projects selected, landslide risk modeling for four projects, and tropical cyclone risk modeling for one project;
- georeferencing and urban pattern analysis for the eight projects selected; and
- site visits and engineering inspections for key physical and environmental interventions in the eight projects selected.

In order to gather primary data from the selected projects, surveys, focus groups and interviews were conducted following an IRB-approved research protocol. These techniques were conducted in the eight neighborhoods across the six different countries where the DRR projects were implemented. The study involved both males and females, and the subjects of the surveys, interviews and focus groups were adults (aged 18 and over with no upper age limitation).

Surveys. The targeted subject for each survey was the head of a household or spouse in the selected neighborhood. We estimated that an average of 100 households per project benefitted directly from the NA-DRR projects, with a total population size of 800 households. The estimated size of the sample was estimated using the sample size calculator, Raosoft Inc., with a margin of error of 4.25 percent and a 95% confidence level, resulting in \( n = 320 \). Subsequently, the sample was distributed in proportion with the estimated population in the selected neighborhoods. The survey process was completed with an average of 44 surveys per project, and a total of 349 surveys. The survey consisted of a total of 39 questions grouped into four sub-topics: social cohesion, DRR, urban informality and life satisfaction analysis (LSA). A preceding section on demographics and housing conditions collected information on
household identification, demographic and socioeconomic aspects of household respondents and housing structural details.

**Focus group discussions.** We conducted one focus group discussion for each of the eight NA-DRR projects. Focus groups for each neighborhood included approximately 8–12 subjects comprised of community leaders, women, people with disabilities and elders who lived in the selected neighborhood.

**Interviews.** The research team conducted eight to ten semi-structured interviews per DRR project with local and national government officers, civil society actors, academics and private sector partners. A total of 105 informants participated in the interviews. Interviewees were approached using the snowball-stratified sampling technique.

**Online Survey.** An online survey was geared toward USAID officers in OFDA (Washington, DC, and LAC regional office) with the support of USAID Monitoring and Evaluation.

We used triangulation, an integrative strategy that purposefully uses multiple theoretical positions to analyze data. In this evaluation, we used several qualitative and quantitative methods (see evaluation design) to analyze the data from the eight urban DRR projects. These mixed methods helped to increase the validity of the evaluation and research findings to answer and satisfactorily address USAID’s questions.

**Evaluation findings**

Although the eight projects evaluated shared NA-DRR characteristics, each project was unique and designed to respond to community needs and distinct socioeconomic and cultural features, thus framing each in specific realities and contexts. Following is a summary of the findings of the questions posed by USAID to guide the evaluation and part of the authors’ report to the funding agency, USAID (Sarmiento et al., 2018). The first four questions respond to the objective of effectiveness and the last three concern project sustainability:

(1) To what extent have projects implemented under a NA contributed to reducing community disaster hazard risks in targeted urban communities in the selected projects?

Four trajectories or pathways of influence were used to reduce community disaster risk:

- **NA-DRR interventions and features associated with secure land occupation:** two key interventions illustrate a successful approach to secure land occupation: the land tenure initiative implemented in Portmore; and relocating at-risk communities in Tegucigalpa.

- **Sufficient and resilient livelihoods:** two main NA-DRR initiatives demonstrate effective DRR: the small business approach carried out in Medellín; and the network of pulperías (grocery stores) implemented in Tegucigalpa.

- **Robust and resilient ecosystems:** three different NA-DRR projects in Lima implemented afforestation projects, initially designed to reduce the risk of rocks falling from slopes and to recover the fragile ecosystem lost over the past decades.

- **Adequate disaster risk and emergency management:** physical works such as pathways, access roads, retaining walls and drainage systems are the axes of risk reduction in neighborhood projects. Pathways were common to the six projects in Central and South America as all the settlements are located on steep slopes. Retaining walls were designed and built in a variety of shapes and sizes to protect against landslides. Infrastructure such as channels to manage the runoff in Port-de-Paix, and gabions in Anse-á-Foleur proved to be highly effective during the passage of Hurricane Irma in 2017. Drainage systems ranged in magnitude from small works in the projects in Lima, Medellin and Mixco, to more complex systems, such as the one built in the Tegucigalpa project.
(2) Which aspects of the urban NA-DRR are most effective? Which aspects of the urban NA-DRR are least effective?

To address this question, we used two different approaches: LSA to measure the level of well-being attributed to the NA-DRR projects’ interventions and cost-benefit analysis (CBA) to calculate and compare benefits and costs of the specific NA-DRR interventions selected. The LSA showed that the categories with the highest impact on life satisfaction improvement were physical works and gains in social mobilization. Neighborhoods that received a community empowerment intervention (social mobilization category) increased their life satisfaction by 0.65 points. Considering that on average, the life satisfaction of all neighborhoods in the study was 2.46, the community empowerment intervention produced an increase in life satisfaction of nearly 27 percent. Other categories with interventions that notably impacted life satisfaction were livelihoods and financial mechanisms, and institutional arrangements. The CBA of the DRR interventions revealed that overall, the USAID project interventions had cost-benefit ratios (BCRs) greater than one point, with the access paths being the most cost-beneficial. A BCR of one indicates that the discounted benefit of implementing an intervention equals its cost. The BCR of physical interventions such as access paths ranged from 6.48 in Rímac to 12.16 in Medellin. Using an average value of the statistical cost of life, the BCR for access paths increases to 98.9 and 47.43, respectively, for Medellin and Rímac. The drainage canal in Port-de-Paix, yielded a BCR of 13.19, valued for benefits from avoided loss of household assets and increase in productive business days. Sanitation interventions, such as septic tanks in Mixco, obtained a BCR of 1.62. Benefits were projected for certain interventions, such as the land tenure registration effort in Portmore, for which the target has not yet been met.

(3) To what extent is the NA effective as compared to more traditional DRR approaches in LAC?

To evaluate the effectiveness of the NA-DRR compared to traditional DRR, we used the approach criterion as the center of analysis, since this is the strategy used to address DRR. We identified six DRR approaches – here called categories – to conduct a thorough comparative analysis of the NA-DRR with other traditional initiatives: area-based; market-based; system-based; institutional-based; individual/household-based; and operational. Some of the DRR initiatives fall into more than one category. The NA-DRR promoted by USAID can be primarily classified as area-based, but it further incorporates aspects of other DRR criteria (market-based, system-based, institutional-based, individual/household-based and operational-based). In addition, the concept of “(neighborhood)” used in the NA-DRR goes beyond the pure geographic meaning of the “(area-based)” category: the neighborhood is a living fabric of social, economic and physical features that provides the residents of a particular territory with an identity, a sense of security, safety, and familiarity. Our literature review revealed that institutions such as USAID, OXFAM, UNDP, DFID and the World Bank used area-based approaches to a certain extent, but without emphasis on precariousness, informality and risk exposure.

(4) What factors influence the effectiveness (or lack thereof) of urban DRR programs using the NA in each country of focus?

We considered two categories of influencing factors for the effectiveness of urban DRR programs using the NA-DRR: reflecting on internal aspects of each project and their immediate environment, and referring to the economic, political and social contexts in a broader sense, that is, outside the project’s control. For instance, in the three projects in Lima, we identified several emergencies triggered by “(El Niño)”
in 2017 in northern Peru that created a “(window of opportunity)” to introduce innovative DRR practices at different government levels. We also observed that local governments with a greater capacity in urban development avoided silos, fostered cross-sectorial integration and tended to mainstream DRR practices within urban development. This was particularly effective and a common feature in Carabayllo, Medellin, Mixco and Tegucigalpa. Other external factors included the volatile political context in Mixco; turnover of municipal personnel in Lima; organized crime and violence in Medellin; and specific land tenure issues observed in Portmore.

(5) To what extent are communities able to integrate DRR practices and take ownership of the NA? What barriers to utilization of the NA exist?

We developed a community involvement indicator (Table III), using qualitative analysis of focus groups and interviews, to assess four aspects of community involvement: active involvement in planning; allocation of human and financial resources; active involvement in maintenance; and social control.

In general terms, the communities were able to integrate DRR practices, although only in few cases took ownership of the NA as a whole. With significant differences among countries, neighbors in Mixco, Medellin, Tegucigalpa, and the three projects in Lima demonstrated appropriation of DRR practices such as better garbage and waste water management for reducing flood impacts and afforestation and gardening to stem the risk of landslides and rockslides. In some cases, such as Medellin and Mixco, people achieved a certain level of empowerment as they started to demand more attention and action from local authorities.

(6) To what extent are municipal and national authorities incorporating and institutionalizing the urban NA? What evidence (including, but not limited to, policy or urban planning changes) is there that municipal or national authorities are managing urban risk differently due to USAID/OFDA’s urban NA-DRR?

A local government involvement indicator was developed (Table IV), using qualitative analysis of interviews and field observations to assess four aspects of local government involvement: active involvement in planning; allocation of human and financial resources; active involvement in maintenance; and regulatory action.

In cases like Carabayllo, Independencia, Mixco, Medellin and Tegucigalpa, the municipalities incorporated new practices, such as the use of GIS and social media for DRR; participatory design and execution of physical works; inter-sectorial working groups for neighborhood development; and inclusion of DRR measures within municipal budget plans. According to our field observations and interviews, the best institutional ownership was achieved in Tegucigalpa, Mixco and Medellin, primarily due to three factors: the level of municipal autonomy to apply DRR;

<table>
<thead>
<tr>
<th>City</th>
<th>Peru Carabayllo</th>
<th>Peru Independencia</th>
<th>Peru Rimac</th>
<th>Peru Medellin</th>
<th>Guatemala Mixco</th>
<th>Guatemala Port-de-Paix</th>
<th>Jamaica Portmore</th>
<th>Honduras Tegucigalpa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active involvement in planning (0–25)</td>
<td>15</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>22.5</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Allocation of resources (0–25)</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>20</td>
<td>22.5</td>
<td>20</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Active involvement in maintenance (0–25)</td>
<td>15</td>
<td>22.5</td>
<td>15</td>
<td>22</td>
<td>17.5</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Social control (0–25)</td>
<td>5</td>
<td>0</td>
<td>2.5</td>
<td>2.5</td>
<td>5.0</td>
<td>0</td>
<td>2.5</td>
<td>20</td>
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<tr>
<td>Community involvement (0–100)</td>
<td>55.0</td>
<td>57.5</td>
<td>52.5</td>
<td>64.5</td>
<td>67.5</td>
<td>40.0</td>
<td>42.5</td>
<td>70.0</td>
</tr>
</tbody>
</table>

Table III. Community involvement indicator
implementers succeeded in creating inter-institutional and inter-sectorial (including private sector) articulations based on agreements and communication, and then translated these into action; and the willingness and commitment of key actors at the highest level of municipal government, such as mayors or municipal managers. On the other hand, participants from Rímac, Portmore and Haiti pointed out factors that limit the institutionalization of the NA-DRR, including: personnel turnover in municipalities; a lack of willingness and commitment from local authorities; and implementer’s lack of capacity/experience in involving local authorities.

What enabling factors and factors impeding success contribute to sustainability of the urban NA-DRR? How sustainable could the targeted urban DRR programs be without external donor support?

Five categories were defined to address the sustainability of the NA projects: social mobilization, institutional arrangements, physical works, environmental improvements and financial mechanisms. Each of these categories comprises both enabling factors and factors that hinder success. Beyond the enabling and impeding factors mentioned, the study found a significant and positive circumstance that we call concatenation. Concatenation refers to the capacity of a project to advance on the achievements of previous projects or initiatives and in turn influence other projects or initiatives to build on its own outputs or outcomes. Through the years of implementation and beyond, these urban DRR projects have shown a remarkable capacity for concatenation. The NA-DRR project in Anse-à-Foleur offers a good example of this phenomenon. The NA-DRR project provided an excellent quality pipeline from the source of the water to the town. Subsequently, the World Bank built ten water tanks, followed by the municipality which built the distribution network. Another example comes from the NA-DRR in Tegucigalpa, where a public university in Honduras took advantage of JICA-sponsored geological studies to advance the studies required by the USAID-sponsored NA-DRR project. At the same time, the NA-DRR project prepared digital elevation mapping based on LiDAR technology (a detection system that uses light from a laser), which now serves the municipality and other projects supported by the international community.

Beyond the characteristics that define the NA-DRR, such as geographic focus, active participation and sectoral concentration, the NA-DRR program strategy has been characterized by closer cooperation among USAID, implementers, beneficiary communities and local and national governments.

Additionally, the introduction of techniques such as systematization (Sarmiento and Herard, 2015) and the post-project review (Sarmiento, Gelman, Jordão and Bittner, 2017) stressed the importance of processes, and a closer follow-up to project implementation, with
special attention to the long-term impacts and the outcomes’ sustainability. USAID has fostered the exchange of practices and experiences among implementers, which has resulted in a substantial collective learning process, one that is unique in terms of depth and quality.

Limitations
Evaluating projects after project closeout was a significant challenge. Not all of the actors who had been involved could be located; community members in informal and precariousness settlements are highly mobile. Another important limitation was the collection of information related to designs, technical specifications and budgets of the project interventions that had concluded between one and three years earlier. Likewise, the high turnover of public employees was evident along with the consequent unfamiliarity of the NA-DRR project – the reason why we resorted to interviewing former employers or employees who had changed their position within the same organization for interviews and information gathering.

In relation to the EB evaluation process, there was some level of resistance among administrators and DRR project implementers from the public, private and civil society organizations to contribute to the evaluation research. Conducting trials or tests to verify the effectiveness and sustainability of practices and processes could be seen as a waste of time and resources, with a strong predominance of outputs vs outcomes. Additionally, some individuals may have been reluctant to submit to any testing or surveys that may point out lack of professional knowledge.

4. Conclusion
Institutions and organizations shoulder the onerous task of evaluating DRR projects and have done so under immense time and resource constraints. The research on evaluation has thus been left wanting in the exploration of causal factors of risk. As a result, the DRR community struggles to demonstrate whether interventions successfully fill the gap and address the root problems of risk. One contributing reason for the research gap has been the lack of support from academia. This paper is a call for action aimed at the academic community to support robust evaluation of DRR practices. We propose an EB approach which zeroes in on the causal factors, steers the focus on to initial and conceptual stages of projects, and prioritizes actions for effectiveness, efficiency and sustainability. The EB approach, along with academic support, can help practitioners and DRR actors on the ground, and inform better DRR policy and practices.

The EB evaluation design in this study has allowed us to answer the seven USAID questions while addressing the proposed objectives of effectiveness and sustainability. The multiple DRR practices/interventions observed were analyzed from different perspectives and methodologies. Our evaluation process carefully documented all DRR interventions for study, and demonstrated the effectiveness and sustainability of interventions of those that had sufficient technical support behind them.

In addition to the EB evaluation process and its results, it was clear that the NA-DRR has expanded the consideration/concept of DRR interventions beyond individuals and households to a settlement approach, addressing critical disaster risk drivers and development gaps, and encouraging a long-term vision. USAID revised the terms of reference of its NA-DRR request for proposals (APS), based on the systematization of experiences, project monitoring, and the permanent feedback from USAID/OFDA project officers and implementing partners.

Our study showed the need to balance physical and social interventions to match individual and collective needs and expectations associated with the common good. Protecting the neighborhood and supporting its cohesion and self-determination are important strategies to build community resilience.
The NA-DRR projects strongly contributed to social mobilization easing to collectively overcome obstacles such as poverty, marginalization, insecurity and despair, challenges experienced daily by communities in informal settlements. This study shows a broader scope than the one initially foreseen for the NA, identifying different strategies with strong incidence on DRR but that can stand alone, such as land tenure, rain and storm-water management, afforestation and housing relocation, among others.

The use of state-of-the-art technologies and the exploration and definition of units of measurement were essential to answering the questions proposed by USAID and mark the beginning of a second study phase – the preparation of a series of peer-reviewed publications that will serve to build a catalog of EB DRR practices. This catalog will inform decision makers and practitioners so that they can incorporate this new knowledge into the project cycle and regular DRR practices. Subsequently, outputs and outcomes obtained from those revised practices should feed rigorous evaluation processes that ensure continuous improvement.

References


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Disaster relief trials: perceptions of a disaster-themed bicycling event

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Abstract
Purpose – Bicycling enthusiasts have been organizing community events in US cities to demonstrate how bicycles may be of use in the aftermath of a disaster event. The purpose of this paper is to examine the perceived value of these events and levels of engagement in the same amongst emergency managers, community organizers and bicycling advocates.

Design/methodology/approach – Data were collected through 21 in-depth, telephone interviews with emergency management officials and bicycling advocates in bicycle-friendly jurisdictions in the USA and analyzed using initial and focused coding, analytic memos and theoretical sorting.

Findings – The study found that event organizers and other bicycle advocates widely embraced the concept as a means to change societal perceptions of bicycles as viable modes of transportation, indicating at least some level of interest in taking an active role in its pursuit. Emergency managers were generally receptive to the idea, but they largely saw the value as restricted to raising public awareness about hazards and individual preparedness measures; and they mostly envisioned for themselves a minimal role in event planning and execution.

Practical implications – The findings suggest that when operating in a resource-poor environment with limited public and political support, there are innovative partnerships and ideas that can be successfully leveraged to advance multiple purposes.

Originality/value – Almost no empirical research has looked at the disaster relief trial concept, given the relative newness and novelty of the idea. An examination of perceived value of disaster-oriented community bicycling events seems warranted as such events continue to grow in existing locations and emerge in new locales each year.

Keywords Disaster, Bicyclists, Preparedness, Emergency management, Community engagement, Bicycle, Disaster relief trial

Paper type Research paper

Introduction
Disaster relief trials (DRTs) are organized community events materializing in various bicycle-friendly cities in the USA with the purpose of demonstrating how bicycles and their riders could potentially assist in disaster situations (Disaster Relief Trials, n.d.). DRTs are patterned after both traditional scavenger hunts and the “alley cat” races of bike messengers – participants navigate their own route between a series of checkpoints dispersed throughout the city and are required to accomplish a succession of tasks (Giddings, 2015). Along the way, they contend with rough terrain, physical barriers and water crossings, all challenges fabricated to mimic disaster conditions. The assigned tasks, such as transporting both fragile and bulky supplies, are designed to imitate those activities which bicycles could complete in an actual disaster event (Disaster Relief Trials, n.d.). Riders accumulate points based on task completion and their speed between checkpoints, with winners demonstrating a deft combination of navigational skills, task proficiency and sheer speed. It is worth mentioning, however, that DRT events retain a distinct emphasis on participation over victory, with a variety of rider divisions being offered including competitive, non-competitive, family and electric-assist classifications (Disaster Relief Trials, n.d.).
Given the disaster focus of DRTs, it might be tempting to assume the events are the brainchild of an innovative emergency management practitioner looking for a novel way to engage a community in disaster preparedness. In reality, the idea was initially conceived by a bicycling enthusiast in the northwestern region of the USA seeking a novel solution to challenges with disaster supply delivery and shelter provision witnessed in the aftermath of the 2010 Haitian earthquake (Giddings, 2015; Page, 2014). The first DRT was held six years ago in Portland, OR and the idea has since gained enough traction with cycling aficionados in other bicycle-friendly areas to initiate events in additional locales including Eugene, San Francisco, Seattle, Minneapolis, Memphis and Bend, OR (Disaster Relief Trials, n.d.).

DRT events capitalize on the view of the bicycle as a utilitarian vehicle, meaning the bicycle is seen as a form of transportation for commuting or accomplishing errands and not just a means to engage in fitness or leisure pursuits. When the bicycle is considered in this way – as a practical and effective way to transport people and goods without reliance on gas, electricity, or even roads – it does make sense that it be regarded as a viable tool to assist in the aftermath of a disaster. Given that a disaster is an event which, by definition, involves a disruption of many, if not all, of the physical and social networks that comprise a community (e.g. Dynes, 1970; Fischer, 2008; Gilbert, 1995; Oliver-Smith, 1998; Quarantelli, 2000), it follows that the bicycle, with its immunities to many of these interruptions, can be viewed as an alternative way to move people and things through an unsettled urban environment.

In short, the bicycle is touted by DRT proponents as a tool to make communities and their citizens better prepared for disruption caused by disaster events (Disaster Relief Trials, n.d.). And events that promote the utilitarian usage of bicycles, such as the DRT, are regarded as a means to raise awareness amongst a variety of entities – the general public, first responders, emergency managers, elected officials – of the potential value that bicycles could bring to a community in general and a disaster scenario more specifically (Disaster Relief Trials, n.d.; Giddings, 2015; Page, 2014). Indeed, the lone exploratory empirical study on these events – a limited case study of the DRTs in the Oregon cities of Eugene and Portland – found that DRTs could be beneficial not only in highlighting the prospective uses of bicycles in disaster events and introducing the bicycle as a tool to emergency managers, but also in reframing community preparedness education and deepening both informal and formal community relationships (Page, 2014).

It is unsurprising that almost no empirical research has looked at the DRT concept, given the relative newness and novelty of the idea. However, a closer examination of its perceived value – not only in the eyes of event organizers, but also from the perspective of other bicycling coordinators and emergency management professionals – seems warranted as disaster-oriented community bicycling events like the DRTs continue to grow in existing locations and emerge in new locales each year. This paper reports the findings of a study that expands the singular investigation done to date by exploring the perceptions of DRT events amongst event organizers, bicycling coordinators, and emergency management professionals in bicycle-friendly communities around the USA.

**Literature review**

While at first glance, an alliance of sorts between the utilitarian bicycling community – including advocates and enthusiasts – and emergency management may seem an unlikely pairing, a deeper consideration of the status of both within many communities suggests that perhaps such a relationship may be both commonsensical and productive. Objectives pursued by utilitarian bicycling advocates and emergency managers – while clearly distinct – both arguably offer great potential benefit to their communities. But, their ambitions remain often unfulfilled, either wholly or partially, and a closer examination of the challenges facing both in making their visions a reality reveals marked similarities.
The woes of bicycle advocacy

Regular utilitarian bicycling has a lengthy list of benefits documented by scholars and advocates alike including health benefits associated with increased physical activity (e.g. Bassett et al., 2008; Cavill and Davis, 2007; Giles-Corti et al., 2010; Pucher et al., 2010), lower associated healthcare costs (e.g. Blue, 2015; Gotschi, 2011; Wang et al., 2005), decreased pollution and congestion related to automobile travel (e.g. Giles-Corti et al., 2010; Komanoff et al., 1993; Rabl and De Nazelle, 2012) and reduced natural resource consumption (e.g. Giles-Corti et al., 2010; Gotschi, 2011).

But these benefits alone are not enough to entice people out of their cars and onto their bicycles for commuting and transportation purposes; the mode share of bicycles within the USA’s transportation system remains small. Bicycling accounts for just 1 percent of all trips, mostly in urban areas (Santos et al., 2009). Only 0.6 percent of workers in the US report using a bicycle to commute to and from their workplace (McKenzie, 2014; Pucher et al., 2011), as opposed to the 86.2 percent who either drive or car-pool (McKenzie, 2014). The dominant cyclists in the US remain a combination of those too young to drive an automobile and recreational or fitness riders who pursue bicycling as a leisure-time activity (Pucher and Renne, 2003; Vivanco, 2013).

The documented benefits associated with regular utilitarian bicycling in tandem with the small numbers who actually ride has led many groups and individuals in the US advocate for increasing such ridership. These range from national organizations such as the League of American Bicyclists and the Bicycle Federation of America to state and local advocacy organizations, as well as city planners, environmental groups and others (Pucher et al., 1999). Pucher et al. (2010) note that “an extensive and rapidly growing literature suggests the need to facilitate bicycling through appropriate infrastructure (such as bike paths and bike parking), traffic calming, training and education programs, and other supportive measures” (S107). Thus, these advocacy groups and individual advocates have used scholarly realizations to call for and – in some cases – implement a range of infrastructure, program and policy initiatives to increase bicycling rates, as well as improve bicycling safety and comfort.

While recent years have seen “a larger percentage increase than that of any other commuting mode,” (McKenzie, 2014, p. 2) it is generally agreed upon by advocates and scholars alike that there is still much work to be done in order to increase ridership and more fully reap the benefits of utilitarian bicycling. But completing that work remains a challenge. Bicycling coordinators and advocates contend with a political and planning leadership – as well as a general public – stuck in the paradigm of automobility (Balsas, 2002; Pucher et al., 1999), misperceptions of the bicycle in terms of skill levels, safety and regulations (Schimek, 1996), an often fractured cycling constituency (Aldred, 2013; Birk and Kurmaskie, 2010), and insufficient financial and technical resources (Aldred, 2012; Birk and Kurmaskie, 2010).

The struggles of emergency management

Likewise, scholars and emergency management professionals have detailed advantages associated with increasing disaster preparedness across stakeholder groups – communities, organizations, neighborhoods, households and individuals. Disputes over a precise conceptual definition of preparedness continue (Kirschenbaum, 2002; Sutton and Tierney, 2006; Staupe-Delgado and Kruke, 2018). However, there exists budding consensus that preparedness is, at a minimum, a dynamic process, anticipatory in nature and involves active steps to be ready to respond and recover from events (e.g. exercises, training, purchase of supplies and equipment, gaining knowledge, adoption of technologies) (Staupe-Delgado and Kruke, 2018). Engaging in these active preparedness steps is said to reduce overall vulnerability to hazards and corresponding events.
(Becker et al., 2012, 2013), allow for a more effective and efficient response as characterized by a decreased loss of life or injury, reduced property impacts, and minimized disruptions to social, political, economic, built and natural environments (e.g. Gillespie and Streeter, 1987; Paton, 2003; Tierney et al., 2001), increase capabilities for coping with the disruption associated with hazard events (Paton, 2003), and allow for a prompt and effective recovery (Paton et al., 2010).

But despite these advantages, “there are major obstacles to achieving anything more than sporadic to modest levels of preparedness at all levels of analysis” (Kreps and Bosworth, 2006, p. 311). The low probability that on any given day a particular community, organization, or household will be impacted by a hazard event means that calls for increasing preparedness are often met with some blend of apathy (Drabek, 2013; Tierney et al., 2001) and complacency (Kapucu, 2008a, b; Wang and Kapucu, 2008) across stakeholder groups. The host of resources necessary to undertake preparedness steps – information, knowledge, time, capacity, money – are not evenly distributed within and across communities (e.g. Becker et al., 2012; Blessman et al., 2007; Tierney et al., 2001; Perry and Lindell, 2003); and, the desire to complete preparedness actions finds itself in competition with other individuals, organizational or community priorities (e.g. Becker et al., 2012; Sutton and Tierney, 2006; Tierney et al., 2001). The continuous nature of the preparedness process, meaning that actions must not only be completed once, but sustained over time (Becker et al., 2012), provides an additional wrinkle. Given these challenges, it is perhaps unsurprising that preparedness across stakeholder groups remains uneven at best, and downright low within certain stakeholder groups such an individuals and households (e.g. Federal Emergency Management Agency, 2014; Kapucu, 2008a; Phillips et al., 2012; Tierney et al., 2001; Webb et al., 2000).

Underwhelming preparedness has been a cause of scholarly and professional concern (Phillips et al., 2012; Tierney et al., 2001), especially given that the number of hazard events occurring each year has been increasing, as have the impacts on individual communities and states and our nation at-large (Rubin, 2012). This rise in number and impacts underscores the need for continued emphasis and improvement in the realm of disaster preparedness; and, emergency management professionals – particularly at the local level – have been the ones tasked with coordinating preparedness activities within their communities (Canton, 2007; Federal Emergency Management Agency, 2007).

As facilitative and not authoritative figures, however, emergency management professionals cannot simply direct an increase in preparedness efforts or compliance with preparedness advice or directives. Rather, these emergency management professionals must work in tandem with individuals and households, organizations and other government agencies to overcome the challenges of preparedness outlined in the preceding paragraph and elicit action (Canton, 2007). This is no small task, especially as emergency management professionals face significant obstacles of their own, including an uninformed and apathetic political leadership (Labadie, 1985; McEntire and Dawson, 2007; Tierney et al., 2001; Somers and Svara, 2009), a disinterested public (Cigler, 1988; Petak, 1985; McEntire and Dawson, 2007), a scarcity of resources (Labadie, 1985; Waugh, 1993; McEntire and Dawson, 2007; Somers and Svara, 2009), a perceived negative cost-benefit ratio for addressing issues (Cigler, 1988; Petak, 1985; Waugh, 1993), a lack of positional authority or recognition within organizations (Labadie, 1985), and, in some cases, a narrow conceptualization of their role as predominantly response-oriented (Stehr, 2007).

The potential benefits of a DRT collaboration
Given shared challenges with political and public constituencies and mutual resources constraints, a DRT event may provide an opportunity for both bicycling advocates and
emergency management professionals to advance their respective aims while sharing in their scarce resources. For bicycling advocates, it could serve – at a minimum – as a way to accomplish their goal of shifting societal perceptions surrounding the bicycle’s usefulness as a mode of transportation (Maus, 2015). For local emergency management professionals – at a minimum – it could provide a means to an uptick in preparedness activity amongst participating individuals. As such, it would seem that DRT events would be welcomed and encouraged by both bicycling advocates and emergency managers alike. The question, however, remains largely unanswered as to how these DRT events are being perceived in bicycle-friendly communities where they are – or may soon be occurring – by the advocates and emergency managers who would stand to gain from them.

Methodology
The negligible discussion of the topic in the academic literature, in tandem with newness of the DRT concept, made a qualitative approach appropriate for this exploratory study. Specifically, this study relied on Charmaz’s (2006) grounded theory model for data collection and analysis. Data were collected using in-depth, semi-structured telephone interviews with DRT organizers, emergency managers and bicycling advocates in the USA’ most bicycle-friendly cities – individuals deemed by the researcher to “have particular features or characteristics which will enable detailed exploration and understanding of the central themes and puzzles which the researcher wishes to study” (Ritchie and Lewis, 2003, p. 78).

To determine the US cities regarded as the most “bicycle-friendly,” the researcher used the League of American Bicyclists’ ratings. The League of American Bicyclists bestows a bicycle-friendly designation of platinum, gold, silver, or bronze on a city when that city’s bicycling programs and policies have met given criteria (League of American Wheelman Inc., 2015). This study invited emergency managers, DRT organizers and other bicycling advocates from those cities who had achieved the gold and platinum designations conferred by the League of American Cyclists – a total of 29 cities from 14 different states. During the course of the project, the researcher discovered that a DRT was being organized in Memphis. Despite the city’s bronze rating (League of American Wheelman Inc., 2015), an invitation was extended to the city’s head of the emergency management, DRT organizer, and bicycling coordinator. Table I shows the breakdown of respondents by position and state.

The researcher conducted interviews between April 2016 and November 2016. The following open-ended questions complemented by follow-ups and probes were asked: tell me about your experience as an emergency manager/bicycling authority; describe the community in which your work; what makes response and recovery from disaster events go better; to what extent have you seen or do you see citizen bicyclists in your community as having a potential role in disaster; what are your thoughts on DRT events; and, what advice would you give to citizen bicyclists who have an interest in being a part of a disaster response or recovery efforts.

Data were analyzed in keeping with Charmaz’s (2006) grounded theory model. Analysis relied on the use of coding, analytic memos, and theoretical sorting (Charmaz, 2006). Coding occurred in two phases: initial and focused. In the initial coding phase, early data – which for the purposes of this project was considered the first three interviews with emergency managers and the first three with bicycling advocates – were examined and coded line-by-line. The researcher deemed at this juncture that the initial codes were sufficient to complete the constant comparative analysis necessary to accomplish focused coding across the remaining data set (Charmaz, 2006). Analytic memos were used throughout the data analysis process to depict emerging categories and perform theoretical sorting (Charmaz, 2006).
Limitations
Restraint should be used when viewing the results of this study given the non-random sampling techniques used. In addition, the refusal of some emergency managers, DRT organizers and bicycling advocates to participate introduces the possibility of non-response bias because “non-respondents are likely to differ systematically from those who take the time to participate” (Chambliss and Schutt, 2006, p. 91). Thus, the results are exploratory and cannot be generalized to all bicycle-friendly jurisdiction and certainly not those outside of the USA. Further research would be needed to determine if these findings would indeed be applicable across bicycle-friendly locations and then extended to include those less bicycle-friendly locales.

Findings
There was varying familiarity with the DRT concept amongst participants. One third had no previous knowledge of DRT events prior to their participation in this study (n = 7). Another third of the participants were at least acquainted with the DRT idea (n = 7), with just over half of that number having gone so far as to engage in initial conversations about holding a DRT within their own jurisdiction (n = 4). The remaining third were well versed in the DRT concept, having directly organized or supported the implementation of a DRT event or having been affiliated with an organization associated with the accomplishment of a DRT event (n = 7).

Seeing the value
Regardless of previous DRT knowledge or experience, participants generally agreed that such bicycling events had the potential to be of value in their jurisdictions. For emergency managers, this added value was perceived to be primarily related to increasing hazard awareness and individual preparedness knowledge amongst those partaking in the competition. Emergency managers collectively acknowledged difficulties associated with convincing citizens to think about and prepare for potential hazards and

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<tr>
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<th>Number of interviewees</th>
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<td><strong>Position of respondent</strong></td>
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<tr>
<td>City emergency management office head</td>
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<tr>
<td>City emergency management office designee</td>
<td>6</td>
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<tr>
<td>County emergency manager</td>
<td>4</td>
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<tr>
<td>Bicycling coordinator</td>
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<td>Bicycling advisory committee member</td>
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<td>Bicycling coalition lead</td>
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<td>DRT organizer</td>
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<td><strong>State</strong></td>
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<td>California</td>
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<td>Wyoming</td>
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<td><strong>Total interviews</strong></td>
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Table I. Breakdown of respondents by position and state.
corresponding hazard events in their jurisdictions. They appreciated the DRT concept as a fun way to possibly persuade participating bicyclists and their tagalong supporters to pay more attention to their own disaster preparedness. For example, one emergency manager stated:

I would say that from my perspective, the largest values are two things: 1) It raises the importance of emergency preparedness. There tends to be a preparedness fair at the DRT where people are talking about either doing Red Cross first aid training or handing out or selling emergency water bottles. 2) It tends to increase peoples’ thinking about the vulnerabilities that we have, particularly related to seismic events. So I think that’s big. It’s just a method to raise awareness.

While several of the bicycle coordinators, advocates and DRT organizers also identified hazard awareness and preparedness as an important outcome for the DRT ($n = 6$), this group collectively saw an added advantage of using DRT events to demonstrate bicycle utility and usefulness. Coordinators, advocates, and DRT organizers generally remarked on their desire to increase the bicycling mode share in their jurisdictions and shift perceptions related to the use of bicycles as a viable transportation option. They perceived DRT events as another opportunity to work toward those ambitions. For example, one DRT organizer explained:

We don’t have the mode share of some other cities have. So, getting that idea of bicycles as toys thrown out the window is one of my main objectives and I really hope that happens. I hope that people stop seeing bicycles as recreation and start seeing bicycles as a useful transportation tool.

There were some bicycling advocates ($n = 5$) who explicitly noted the importance of DRTs in demonstrating the specific capabilities that bicycles could offer in a disaster and raising overall awareness of their usefulness in the disaster context.

Beyond increasing individual preparedness and/or demonstrating bicycle utility, there were a few emergency managers ($n = 3$) and bicycling coordinators, advocates or DRT organizers ($n = 4$), who also saw value in the DRT events in terms of building a sense a community amongst the bicyclists within the jurisdiction. As summarized by one of these emergency managers:

One, it builds community, which, according to research everywhere, is never a bad thing. And I want to build community, but also educate folks. So, the outreach and community building is one thing and then the education of the public is another.

And all the DRT organizers plus a few emergency managers ($n = 3$) cited building relationships and partnerships between entities within the jurisdiction – extending from community bicyclists, bicycling organizations, and emergency management offices to other organizations in the community such as universities, food banks, breweries, community gardens, CERT teams, radio operator groups, the local Red Cross, Safe Routes to School programs and ROTC units – as a related positive outcome. As one DRT organizer stated:

At two of the food bank locations, riders pick up boxes of food. And that showed a great partnership—they deal with people in crisis all the time and they are a big part of emergency food for a larger incident. And that is something, food and water, that people might actually carry on a bike. And I think we had a partnership with a community garden one year. So, riders actually hauled around buckets of dirt one year for a while.

Thus, while some differences existed between emergency managers and bicycling advocates in terms of how they viewed the value of potential DRT events in their communities, the concept in general was supported by a clear majority of participants. Most participants suggested there was enough mutual benefit or compatibility of desired outcomes to pursue some form of basic collaboration between the emergency management
and bicycling communities, as well as with additional community partners, in relation to DRT events. As asserted by one bicycling coordinator:

But something like this, it would be part adventure race, part education and awareness. I can see that being something that fits into a lot of goals of different agencies. So, it certainly works for us in terms of promoting and encouraging people to use alternative transportation. It would work for public health. It would work for our emergency coordinator and the local Red Cross to do emergency preparedness. So, I think that’s kind of a neat idea.

It should be noted here, however, that for most emergency management participants, the DRT and its perceived value must be considered separate from the perceived value of citizen bicyclists in disaster response more broadly. While the notion of a DRT event was met with general emergency manager approval, support for further development of a role in disaster response for citizen bicyclists beyond such an event – while embraced at some level by all bicycling participants – received a far more varied and nuanced reception from emergency management participants (see Kirkpatrick, 2018).

Making it happen
DRT organizers and others who had been affiliated with DRT events stressed the amount of work involved in planning, organizing, and making the events happen. But, while there was general agreement of a DRT’s potential to add value in a jurisdiction, there was some variation amongst respondents related to the role of emergency management organizations vis-à-vis other organizations or individuals in terms of involvement with the efforts surrounding planning and organizing the event.

Most emergency managers, particularly in jurisdictions where DRTs had not yet been run, perceived their organizations’ role as primarily one of support as opposed to a driver of a DRT event. In this support role, they would be willing to undertake such tasks as attending the event, providing for the supply and distribution of disaster preparedness materials, providing some additional limited supplies such as water, and assisting primary organizers in making connections with other members of city government for such things as permits. These participants indicated minimal willingness to take on more fundamental tasks such as providing direct and/or significant funding, soliciting for in-kind donations, developing routes and activities, completing necessary permitting, advertising, recruiting volunteers or coordinating partner organizations. As one emergency manager stated:

We wouldn’t do the heavy lifting behind it and we are not going to be the driving force behind making it happen. But we would help support. We would have a booth. And if we needed to help make contacts with the different transportation department folks or whoever it was with roads or whatever else along those lines to make it happen, we would help support that.

Respondents offered limited capacity in terms of time and funding as the primary rationale for espousing a more supportive role, although a perception that there was value in the event being community driven vice government driven was also suggested.

However, in two of the five participating jurisdictions where a DRT had taken place, respondents indicated that the emergency management organization had taken greater interest and a more active role in driving a DRT event. Respondents offered level of interest by a member or members of the emergency management organization and organizational capacity as possible explanations for this increased emergency management contribution to driving events. It is worth noting here that where the emergency management organization had taken a more active role in the DRT process, that organization’s participation was being spearhead by a person with a position title and/or experience related to community outreach and public participation.
Overall, the data suggest that for DRTs to happen in a jurisdiction, the primary onus must be on interested volunteers from the general bicycling population or from bicycling advocacy groups to initiate and propel the events forward – a role the majority of bicycling participants seemed at least interested in fulfilling – with emergency managers and emergency management organizations playing a supporting role. In some instances, this bicycling volunteer base may play to emergency management interest or benefit from extended emergency management capacity to take on a more active role in the planning and organizing of events.

**Discussion**

This exploratory study found that DRT events would be generally embraced within bicycle-friendly jurisdictions by bicycling advocates and organizers, as well as emergency managers. There exists sufficient space within the DRT concept for both the utilitarian bicycling community and the emergency management community to feel their purposes are being advanced. For DRT organizers and other bicycling advocates, the concept furthered ambitions of changing societal perceptions of the bicycle as a viable mode of transportation, while for emergency managers it primarily advanced goals of raising public awareness about hazards and individual preparedness measures.

Although some differences existed between the two primary groups studied – emergency managers and bicycling advocates – in terms of level of engagement, the fact that these two groups with discrete and dissimilar aims could potentially agree to pool energies and resources at some level to create an event that would advance the objectives of both is notable. It suggests that when operating in a resource-poor environment with limited public and political support, there are innovative partnerships and ideas that can be successfully leveraged to advance multiple purposes. Emergency managers and bicycling advocates can not only look to each other, but can also consider other innovative associations and designs to further their respective purposes.

It is perhaps a noteworthy point of discussion that few participants – particularly emergency managers – specifically highlighted community engagement or relationship building as a perceived benefit of the DRT concept. Within the disaster literature, there has been a growing understanding that the strength of social networks and relationships strongly influences how individuals fare in both response to and recovery from disasters (e.g. Aldrich, 2011, 2012; Hawkins and Maurer, 2010; Koh and Cadigan, 2008; Murphy, 2007; Sadri et al., 2018; Thornley et al., 2015; Yamamura, 2010); and, increasing attention has been paid in both literature and policy to the importance of actively engaging individuals and the communities to which they belong within municipalities – e.g. neighborhoods, churches, civil society organizations interest and hobby clubs – as dynamic resources through the disaster lifecycle, including preparedness (e.g. Federal Emergency Management Agency, 2011; Koh and Cadigan, 2008; Murphy, 2007; Sadri et al., 2018; Storr and Haefele-Balch, 2012; Thornley et al., 2015; Twigg, 1999, 2015; Wachtendorf and Kendra, 2006). This suggests that the realm of preparedness would extend to activities that would help individuals and communities – including formal emergency management – communicate openly, know and trust one another, interact regularly, and develop known and accepted roles in the aftermath of hazard events (Jensen, 2011; Kapucu, 2008b).

The DRTs, as community social events, could be viewed as opportunities to indeed build trust and social cohesion (Aldrich and Meyer, 2015; Paton and Johnston, 2001), create a loose set of ties between both the individuals and organizations involved (Federal Emergency Management Agency, 2011; Longstaff, 2005; Norris et al., 2008), and engender “a sense of community, efficacy, and problem-solving” (Paton and Johnston, 2001, p. 274). More specifically, through these DRT events, participants can interact – and hopefully develop
relationships – with other bicyclists within their neighborhoods and cities. Individuals can potentially add nodes to their social networks and build a sense of community with others who not only share an interest in bicycling more broadly, but who may also share in a cultural orientation that strays from the dominant car culture (Oosterhuis, 2016).

Beyond these individual connections, associations can also potentially be developed between bicyclists as a collective unit and other local organizations and entities. Through the planning and execution of the DRT event, the bicycling community is theoretically developing trust and subsequent bonds that can extend not only to the formal emergency management institution but go further to include a variety of other existing community groups and organizations ranging from local non-profit organizations to college student groups to other special interest clubs, e.g., amateur radio operators and gardeners. It can be argued that what is being accomplished by the DRT in regard to social integration and bonding between and within communities has the potential to be at least as valuable, if not significantly more so, both to ability a person and to a community impacted by a disaster event than a one-way communication of hazard and preparedness information (Aldrich and Meyer, 2015; Murphy, 2007). Given this developing understanding of the importance of community engagement and relationship building within the preparedness domain, it is perhaps surprising that more emergency managers did not highlight the potential of DRTs to advance these aims.

To be clear, the above point of discussion is not intended to serve as an indictment of emergency managers. Educating the public and enticing them to engage in traditional preparedness activities are worthwhile endeavors. Further, the fact that there was general positive support for the DRT concept by the emergency managers suggests at least some tacit recognition of the additional social value. And to be fair, it should be noted that most bicycling advocates did not perceive the social benefits detailed above to be the driving force behind organizing a DRT event either – their primary focus centered on drawing positive attention to the many practical uses of the bicycle. But, perhaps this lack of explicit connection with community engagement and relationship building it is noteworthy in terms of levels of engagement.

With the perceived purpose of a DRT confined to simply sharing information with the public seems to come a vision from emergency managers of a mostly restrained level of involvement in the planning and implementation process of the event. Organizers from the bicycle community were seen as the key drivers and champions in most cases. However, it may be instructive here that the emergency managers most directly involved in the DRTs had community outreach or public engagement as part of their job description and professional background. It could be that those with these titles and background had a greater appreciation for the value of engagement and relationship building that drives their involvement; or, given their title and background, perhaps they may have the time and skillsets to actively engage with various communities and leverage passionate volunteers and others within those communities. Regardless, this hints at the idea that the way in which emergency management institutional time and resources are allocated, skillsets developed and appreciated, and expectations managed may need to be reconsidered to allow community identification and engagement to be at least on par with other institutional demands if a more equivalent level of involvement between the bicycling and emergency management communities is desired.

Conclusion
This research sought to understand the perceived value of DRT events and levels of engagement in the same amongst emergency managers, community organizers and bicycling advocates. It found that indeed DRT organizers and other bicycle advocates widely embraced the concept as a means to change societal perceptions of bicycles as viable
modes of transportation – and indicated at least some level of interest in taking an active role in its pursuit. However, the emergency management perceptions of value and subsequent engagement were more a bit more gradated. While emergency managers were generally receptive to the DRT idea, they largely saw the value as limited to raising public awareness about hazards and individual preparedness measures with most placing limited emphasis on what literature and policy would suggest are other avenues to preparedness – community engagement and social integration. The roles emergency managers envisioned for themselves varied, with more active roles in DRT planning and execution being assumed by those with a job title and/or professional background in community outreach and public participation.

While the findings of this study make a meaningful contribution to the discussion of perceptions of DRTs specifically and discuss some implications for the same, additional research is needed to address both the value of the community grassroots events themselves and perceptions of those types of events more broadly. Future research could seek to gather data from individual and organizational participants in community grassroots events to empirically measure the effect of the event on both preparedness and other social or organizational outcomes. It could also examine if these perceptions of the DRT extend to other types of community events in the studied jurisdictions, as well as how community events, whether a DRT or other type of event, are perceived in other jurisdictions.

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Further reading


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Evaluation of an organization-based psychological first aid intervention

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Abstract

Purpose – The purpose of this paper is to develop and assess an organizational intervention consisting of psychological first aid (PFA) and Open Space Technology (OST), and its impact on individual resilience and perceived organization support.

Design/methodology/approach – The study used a non-experimental, pre-test and post-test design. Measures of employee post-trauma, resilience and organizational support were measured before and after the PFA intervention.

Findings – Paired sample t-tests revealed significant pre/post-increases in individual resilience and perceived organization support. Correlational analysis revealed that resilience was associated with perceived organization support. Evaluations revealed that participants found the small group sharing, information about coping and the open space problem-solving activities particularly worthwhile.

Research limitations/implications – A limitation of the study was the lack of a randomized control group in the design. Future research may utilize more robust designs such as experimental and longitudinal studies to evaluate impact.

Practical implications – This study indicates how the use of an organization-based intervention can be adopted for employees who undergo an emergency in their workplace. The combination of PFA and OST was found to be valuable in improving individual resilience and perceived organization support. In addition, OST can better facilitate problem-solving performance in intact groups, as it enhances collective interaction and community efficacy among survivors.

Originality/value – The study contributes to the dearth of knowledge on the use of PFA when used in an intact organization as part of its crisis intervention.

Keywords Psychological first aid, Group-based intervention, Open space technology, Resilience, Organizational support, Philippines

Paper type Research paper

Every year, millions are affected by natural and man-made hazards that lead to loss of life, physical injury, and damage to homes and communities. Disaster survivors are also at risk for emotional and physical health problems and some may even suffer from post-traumatic distress. A key to prevention, however, is to provide mental health and psychosocial support (MHPSS) in order to develop survivors resilience and ability to overcome adversity (Fraser et al., 1999).

In the past decade, international aid and health institutions have endorsed psychological first aid (PFA) as the preferred MHPSS intervention immediately after a disaster (Shultz and Forbes, 2013). PFA is described as a set of helping actions aimed at supporting the adaptive functioning of individuals and reducing post-trauma distress (Ruzek et al., 2007).

The authors wish to thank the Department of Environment and Natural Resources (DENR) for their support.
PFA has typically been delivered individually. However, in low resource countries with minimal mental health resources, individual interventions may not always be feasible. Recent years have seen an expansion of PFA to group-based formats (Ulman, 2004; Everly et al., 2006; Johnstone, 2007). In group-PFA, survivors experience psychosocial processing and provided psychoeducation on typical responses to traumatic events and strategies on adaptive coping in small groups (Ruzek et al., 2007). Researchers suggest that group-based intervention offers a unique advantage in processing traumatized individuals who share a traumatic experience by connecting survivors with informal and formal support systems available in their community (Everly et al., 2006; Ulman, 2004).

Despite its acceptance, there is a dearth of evidence on the effectiveness of PFA (Dieltjens et al., 2014). Although there is some literature on its use in communities (Landoy et al., 2015) and schools (Pynos and Nader, 1988; Ramirez et al., 2013; Cain et al., 2010), there is little in terms of its application in the workplace.

However, there is recognition of the importance of implementing and evaluating PFA, especially in high-risk organizations (Forbes et al., 2011). There is also preliminary evidence on the effectiveness of PFA training for managers and staff (Lewis et al., 2014). Given the lack of research on the actual implementation of PFA within organizations, this study seeks to provide evidence of an organization-based PFA for employees whose office was razed by a fire.

Organizational support
Organizations are not exempt from typhoons, fires, earthquakes and other hazards. They can face significant financial losses and infrastructure damages because of disasters. Beyond these, however, workers may experience negative outcomes that may disrupt their productivity and well-being. Hence, providing organizational support for employee survivors is important.

Organizational support has been defined as the extent to which employees perceived that their organization cares about their well-being and values their work contributions (Eisenberger et al., 1986). Studies show that the employee perception of support from their organization is positively related to their level of attachment towards the organization and reduced absenteeism (Eisenberger et al., 1986). Perceived organization support is also related to turnover intentions, satisfaction and organizational commitment (Cropanzano et al., 1997).

Post-disaster, organizations can help their employee survivors in a number of ways. They can help ensure employees are safe, have basic needs, and receive whatever medical or housing services they need. Beyond these, organizations can support their employees by providing mental health interventions to increase their resilience.

Psychological first aid
Studies show that the resilience of disaster survivors is a function of a number of factors: a sense of safety, calm, a sense of self- and community efficacy, connection, and hope (Hobfoll et al., 2007). These factors are embedded as core principles of PFA (Ruzek et al., 2007).

In applying the core principles of PFA, the National Child Traumatic Stress Network suggested eight components: contact and engagement, safety and comfort, stabilization, information gathering on current needs and concerns, practical assistance, connection with social supports, information on coping and linkage with collaborative services (Ruzek et al., 2007). With each component, Vernberg et al. (2008) has stipulated core actions specifying recommendations on how to work with disaster survivors. The first action – Contact and Engagements aims to connect with a survivor in a non-intrusive and caring manner. In the second action, Safety and Comfort, the goal is to provide both emotional and physical comfort to the survivor. Stabilization aims to reduce stress, calm and orient a distraught individual. The next phase is Information Gathering, the goal of which is to evaluate individual needs and concerns, and further collect information to determine appropriate interventions. In the next phase, Practical Assistance, the goal is to help the individual problem solve. The step
Connection with Social Support aims to reconnect individual with their primary support system. In the phase Providing Coping Information, survivors are given information and education on topics such as stress reactions and coping skills to help them manage anxiety. Linkage with Collaborative Service seeks to facilitate individual with needed immediate services, and inform them of available resources they may need in the future.

The World Health Organization (World Health Organization, War Trauma Foundation and World Vision International, 2011) simplified the aforementioned steps into three action points: look, listen, and link. Look involves ensuring survivors’ safety, basic need and checking for serious distress reactions. The next phase involves listening to survivors’ needs and concerns, and helping them to feel calm and safe. The last phase involves helping survivors address their basic needs by linking them to institutions that provide social services or to individuals who may assist them to access these services.

Although there is consensus on the principles that underpin PFA, the evaluation of its outcomes is still in its infancy (Lewis et al., 2014). However, studies among PFA providers reveal that perceptions on PFA are associated with a reduction of distress and the promotion of a sense of safety, calmness and self-efficacy (Landoy et al., 2015; Hechanova et al., 2015).

Application of PFA in organizations
Contemporary perspectives view resilience not as a fixed attribute but as an interaction of individual and environmental factors. At the individual level, resilience factors include the ability to identify one’s stressor, appraise one’s capacity to take action and to problem-solve. Environmental factors include the reduction of risk and resource inequities, creation of linkages, provision of information, engagement of stakeholders, provision of social support and boosting decision-making skills (Forbes et al., 2011).

Although PFA has typically been conducted individually, there is increasing attention on group-based interventions. Group-based interventions offer a distinct advantage in addressing the needs of traumatized individuals because it harnesses both personal and community resilience (Shultz and Forbes, 2014).

The literature on PFA when applied within organizations is scant and more conceptual rather than empirical. For example, Forbes et al. (2011) suggested a phased approach for implementing PFA particularly in high-risk organizations. The first phase involves the development of PFA-consistent organizational policies and procedures. The policy should describe responsibilities of supervisors, peers and welfare personnel. Following such acknowledgment, procedures need to be articulated on monitoring survivors, provision of information related to self-care and pathways to obtain services. Once policies and procedures are in place, the second phase is the promotion of the policy and training of staff. Forbes et al. (2011) suggested that a brief education session backed up by materials would be sufficient for most staff. However, those designated to provide peer support may receive more skills training. This should include skills practice, role-playing, feedback and coaching. In addition, during the actual delivery, providers need to be observed and provided supervision.

In the third phase (delivery of PFA), Forbes et al. (2011) described actions organizations can take vis-à-vis each step in PFA process, as prescribed by the National Center for PTSD. For the core action of contact and engagement, organization staff may respond to contact or initiate contact in a non-intrusive, compassionate, and helpful manner. In terms of the core action of safety and comfort, organizations should immediately enhance and ensure safety and provide physical and emotional comfort. As part of stabilization, when needed, staff should calm survivors who are emotionally overwhelmed. In the next phase, staff should identify immediate needs of survivors (information gathering), offer practical help to address needs and concerns (practical assistance). Staff may also provide information on stress reactions and
coping to reduce distress and promote adaptive coping. They may also link survivors with primary support persons including family, friends and psychosocial providers (social support) as well as available resources and services (linkage with collaborative services).

Finally, the fourth phase of the Forbes et al.’s (2011) model involves the monitoring and follow-up of staff. They suggest that for a low-level risk, this may simply involve asking colleagues or supervisors to check on the recovery of survivors. For those with a higher level risk, a more formal evaluation by health or welfare personnel may be necessary.

Although there has been no empirical evidence demonstrating the impact of the model, Forbes et al. (2011) suggested ways to evaluate each phase of the model. In the first phase, outcomes would be the existence of policies and procedures that embed PFA principles. In the second phase, measures could include the awareness of policies and procedures as well as the acquisition of required knowledge, skills and attitudes. Knowledge could be on the roles of various stakeholders, the impact of disasters, indicators that survivors may need psychosocial support and strategies for self-care. Skills could include the ability to demonstrate the core actions in PFA and attitudes that would be essential in delivering PFA. In the third phase, evaluation could involve the extent to which policies and guidelines were followed and whether the PFA core principles were implemented. Outcome measures could also include whether survivors who received PFA felt supported and reported they received the help they needed and whether those who needed more psychosocial support have been identified and have received the help they needed. Other measures are distress, absenteeism or stress-related outcomes as well as occupational functioning can be used to evaluate the effectiveness of the provision of PFA.

Open space technology (OST)
The framework proposed by Forbes et al. (2011) suggests a phased process for the implementation of PFA but does not prescribe a specific process. Instead, they recommend using the core actions in PFA, as described by the National Center for PTSD. Although these core actions are clearly described to enable delivery at an individual level, when an entire organization has been affected, individual processing may take too much time or require too much personnel. Thus, there may be a need for large-group approaches.

A potential mechanism particularly for a more rapid engagement and collaborative problem-solving in a large group of stakeholders is the OST (Owen, 2008). OST is a participatory methodology that assumes that people can contribute and co-create their organization’s future when given the opportunity to do so (Owen, 2008). It is a participant-driven process where participants set the agenda by identifying concerns or issues they wish to discuss. After the initial brainstorming of topics, a meeting agenda is set and simultaneous meetings are held. Each meeting runs for a specific period of time and participants are invited to brainstorm on the topic. Participants can not only choose which meeting they join but are also allowed to move from one meeting to another. A volunteer facilitator in each group summarizes and reports the results of their discussion (Owen, 2008).

There is some evidence of the efficacy of OST post-disaster. A study in the Philippines described the use of OST for selected survivors of Supertyphoon Haiyan. The group-based PFA intervention used small group sharing, plenary psychoeducation on stress and coping, as well as group problem-solving using OST. Pre and post-test evaluations revealed increased disaster knowledge and disaster coping self-efficacy (Hechanova et al., 2015).

Given the dearth of studies on large group psychosocial interventions post-disaster, this study aims to add to the literature by describing and examining an organization-based PFA intervention design by examining its effect on individuals’ resilience and perceived organizational support. More specifically, it seeks to answer the following research questions:

RQ1. Can an organizational PFA intervention improve individual resilience?
RQ2. Can an organizational PFA intervention improve individual perceived organization support?

RQ3. What is the relationship between individual resilience and perceived organization support?

Method

Organization-based PFA

The intervention was designed for a government agency (Department of Environment and Natural Resources – Land Management Bureau) whose seven-story building was razed by a fire. Although there were no mortalities because the fire took place after office hours and there were no workers in the building, approximately $1.4m worth of equipment and documents were destroyed. The incident also led to the disruption of work and routine among the affected employees because of the uncertainty of employment and the loss of equipment, documents and personal effects. To address the psychosocial needs of distressed employees, an intervention was requested and designed using the core principle of PFA.

Phase 1: introduction. One of the core principles of PFA is providing a sense of safety for the participant (Vernberg et al., 2008; Forbes et al., 2011). The organizational-PFA was done in a private venue where affected employees were welcomed by human resource (HR) personnel and it was emphasized that the session was a safe space for participants to share whatever they wished to talk about.

Phase 2: group sharing. After the introduction, participants were divided into smaller groups with five to eight members. All participants were rank and file employees who were randomly assigned to a group and a facilitator. Facilitators were volunteer psychologists (external to the organization) with previous training on PFA. However, the groups also had co-facilitators, HR personnel who provided training on PFA. The goal of the small group session was to process experiences, normalize mild anxiety reactions, and affirm positive coping strategies of the participants. In the small groups, participants were asked to share how they were. Facilitators empathized and assured participants that their anxiety reactions were normal, given the abnormal situation, and affirmed their adaptive strategies in alignment with the PFA core principle of promoting self-efficacy (Vernberg et al., 2008; Forbes et al., 2011).

Phase 3: psychoeducation and mindfulness. Another PFA core principle is to promote sense of calm and stabilization (Vernberg et al., 2008; Forbes et al., 2011). To do this, a plenary session on stress reactions, coping and a brief mindfulness was conducted by volunteer psychologists.

Phase 4: problem solving. PFA principles include providing practical assistance and social supports, and linking individuals to available resources and services (Vernberg et al., 2008; Forbes et al., 2011). This was facilitated through an OST session that consisted of three phases: agenda setting, meetings, plenary sharing. In the first phase, participants identified relevant issues and concerns that they wished to discuss. The facilitators then clustered the responses of the participants into various themes that became the meeting agenda for the day. The agenda items elicited included topics such as: document management, dealing with customer inquiries and complaints, facilities and equipment, HR management concerns, job security, and employee well-being. Facilitators assigned meeting spaces for each of these agenda item.

In the meeting phase, participants were invited to join whatever topic they wished to contribute to. Participants were also encouraged to freely move from one discussion to another. Volunteers facilitator were assigned to document the suggestions in an easel sheet.

The last phase was a plenary sharing of suggested solutions to employee concern. Each group’s suggestions and ideas were reported to the large group.

Phase 5: closing activity. PFA principles also include enhancing the sense of community efficacy, promoting connectedness, and instilling hope among members of the organization.
The final activity was designed to reinforce the link between management and employee, give employee the sense of being heard and instill hope and connection among members of the organization. Members of the management team responded to the presentation of identified problems and solutions by the employees. Leaders identified their immediate action points from the suggestions raised and shared information on concrete actions being taken to regain the normalcy of work operation. They also laid out the timeline and future plans of the organization to address employee needs and concerns. At the end of the intervention, participants were asked to evaluate the session, provide feedback on what they found the most and the least helpful and give suggestions.

Participants
A total of 95 regular employees were invited and voluntarily joined the group-based PFA intervention that was held three days after the fire. Of the 95 participants, 65 provided informed consent to participate in the research and had both pre- and post-test data. Respondents were mostly female (66 percent). Participants’ ages ranged from 21 to 63 with a mean age of 44 years old.

The PCL-6 (Weathers et al., 1993) measuring PTSD was administered to employees. Scores revealed 26 participants (40 percent) scored below 14 that Lang et al. (2012) described as low risk. More than half (n = 39, 60 percent) had scores 14 and above, indicating moderate risk for post-traumatic stress disorder (Lang et al., 2012).

Measures
Resilience
This refers to the ability to handle stressful situation and adapt to sudden change in life. It was measured using the Connor–Davidson Resilience Scale (2003) that consisted of ten items such as “I can deal with whatever comes my way,” “I am not easily discouraged by failures” and “I think of myself as a strong person.” Participants were asked to indicate the extent to which the statements describe them using a five-point Likert scale with 0 as “not true at all” to 4 “true all of the time.” Internal consistency (Cronbach’s α) was 0.87 (pre-test) and 0.83 (post-test).

Organization support
This measures the extent of company support as perceived by the participants. Participated rated five items on their agreement using a six-point Likert scale with 1 as “not at all” to 5 “extremely.” Sample items included, “My company cares about me,” “My company listens to me when I need to talk,” and “My company supports my needs.” Internal consistency reliability of the items (Cronbach’s α) was 0.94 (pre-test) and 0.96 (post-test).

Post-traumatic stress symptoms
These refer to symptoms of PTSD including disturbing memories, thoughts and ideas, feelings of upset when reminded of the experience, avoidance of activities related to the experience, isolation, irritability or anger and difficulty in concentration. It was measured using the abbreviated version PCL-6 (Weathers et al., 1993). Participants were asked the extent they were bothered by such a symptom using a five-point Likert scale with 1 as “not at all” to 5 “extremely.” Internal consistency reliability (Cronbach’s α) was 0.84. Score can range from 6 to 30 with suggested cut-off scores of 14, indicating a moderate level of post-traumatic stress (Lang et al., 2012). Participants’ scores ranged from 6 to 24, with a mean of 14.32 (SD: 4.36).
Procedure
Three days after the fire, the organization coordinated a psychosocial support program for its affected employees. Volunteer psychologists and HR personnel were oriented toward the organization-based PFA intervention design. A pre-test was given prior to the intervention that measured PSTD symptoms (PCL-6), individual resilience, and organization support. A post-test measuring individual resilience and organization support was conducted a week after the intervention.

Results

Individual resilience
The hypothesis that the organization-based PFA would improve the resilience of participants was supported. As seen in Table I, scores for resilience significantly improved before (Ave Pre M = 2.83, SD = 0.52) and after the program (Ave Pre M = 3.12, SD = 0.43) ($t = 4.56, n = 65, df = 64, p < 0.01$).

Perceived organization support
There was also support for the hypothesis that the organization-based PFA session would improve the perception of organization support of participants. As seen in Table I, scores for organization support significantly improved before (Ave Pre M = 4.42, SD = 0.87) and after the program (Ave Pre M = 4.61, SD = 0.91) ($t = 2.056, n = 65, df = 64, p < 0.05$).

Correlational analysis
Finally, results affirm the relationship between individual resilience and perceived organization support. Correlational analysis (see Table I) revealed that resilience was correlated with perceived organization support before the program ($r = 0.43, p < 0.01$) and the correlation was even higher after the program ($r = 0.62, p < 0.01$). This positive correlation indicates that when individual resilience increases, perceived organization support also increases and vice-versa.

Qualitative data
Beyond the quantitative data, participants’ surveys included open-ended questions about what they liked the most and the least liked part of the program. Recurring sentiments and thoughts of the participants were clustered according to themes. Among the things participants found helpful was being able to release their feelings and emotions about the incident (what I like most about the activity is when we shared our emotions, sentiments and feelings for us to unload our burden). The group sharing was an opportunity to relieve stress and unload burden as expressed in comments such as, “it relieved stress and negative thoughts” and “it lightened the burden we carry due to disaster that happened.” Moreover, participants realized the significance of the group as source of collective support “I learned that we need one another to achieve a common goal.” Participants also reported that the intervention enabled their resilience, “it helped me to bounce back after the fire.”

<table>
<thead>
<tr>
<th>PTSD symptoms</th>
<th>Pre-resilience</th>
<th>Post-resilience</th>
<th>Pre-org support</th>
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<tr>
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<td>0.43**</td>
<td>4.42</td>
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<tr>
<td>2.83</td>
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<td>3.12</td>
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<td>0.66**</td>
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<td>4.61</td>
<td>0.91**</td>
<td>0.38</td>
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Notes: (Cronbach’s $\alpha$ values) **$p < 0.01$
The intervention appeared to enabled resilience by providing them an opportunity to think and generate solutions to their concerns, “it gave me ideas when I didn’t know what to do.” It provided an opportunity for members to participate “everybody was given chance to participate and render their own views, comments and recommendation on the issue at hand.” For some, the use of open-space facilitated was an empowering experience. One participant shared her appreciation for the chance to be involved, “we gave ideas and possible solutions to the problems that the Bureau is facing right now.”

The activity made participants feel supported by the organization “realization that the central office loves and cares for the bureau” and “the encouragement and support from our head office, feelings of assurance and positivity.” However, a participant suggests to have adequate time for the activities “more time, one day is not enough.”

Discussion
The current study described the design and outcomes of an organization-based PFA for a government agency that experienced a fire. Results show that the intervention had a positive impact on employees’ resilience. This is consistent with the PFA goals of enhancing both individual and community resilience by encouraging self-efficacy among disaster survivors, promoting healthy coping, and providing short- and long-term adaptive functioning (Ruzek et al., 2007; Uhernik and Husson, 2009).

Employee feedback indicated that they found the group sharing worthwhile. This affirms studies that a group approach is useful in a collectivist and interdependent culture (Hechanova et al., 2015). Group-based intervention makes processing simple as participants share similar characteristics. Being in a group processing provides structure, validates individual traumatic experience with others, decreases feelings of isolation, and fosters ventilation and grief in a safe environment (Ulman, 2004).

The result validated that the intervention program increased employee perceptions of organization support. The OST activity was received well because it provided opportunities for employees to express their collective needs and elicit ideas to find solution. This supports the use of OST as an organizational intervention that allows employees to amplify ideas and generate self-organization (Arena, 2009; Lewis et al., 2014). The organizational PFA enables employees to organize themselves and collectively communicate to leaders of the organization.

Moreover, results affirm the relationship between organization support and individual resilience. This affirms the value of organizational interventions in enabling resilience, connectedness, community efficacy, and instilling hope (Landoy et al., 2015; Hechanova et al., 2015).

A major limitation of the study was the lack of randomized control groups. The lack of a control group makes it difficult to determine the extent to which the outcomes are only due to the program intervention and not a product of other factors such as time. Thus, the results must be carefully interpreted. When possible, a randomized control treatment design would enable more robust conclusions on the effectiveness of the intervention. Moreover, post-evaluation results were limited to a week after the intervention. Longitudinal analysis may be employed to follow through participants stress levels.

Implications
Limitations notwithstanding, results show a promising organizational intervention that can be used when a disaster strikes an entire company. The use of an intervention that combines group PFA and OST may be an effective way to address the psychosocial needs of survivors during the emergency phase of a disaster. The design adheres to the core principles of PFA and at the same time allows that it be given to a large group of survivors. The aforementioned design can be administered in less time than a one-on-one intervention takes and requires less personnel and resources. In this design, the basic requirements were
simple: a large enough space for the small group discussions and meetings, easel boards and sheets and markers. In addition, the presence of trained facilitators as well as supportive leaders were key to the design.

In this study, given the lack of time to provide intensive training to the HR staff, they were provided a brief orientation on PFA prior to the intervention and served as co-facilitators to volunteer psychologists. Ideally, however, organizations can develop the internal capacity to deliver such support for the employee survivors. Having internal capability would make organization less reliant on external providers and enable them to provide interventions immediately after a disaster.

It should be noted, however, that the organizational PFA intervention may not be sufficient for all survivors and there may need to be other psychosocial support required for specific groups, especially for the 60 percent of participants who showed moderate risk for PTSD and for whom PFA may be inadequate. It is important that follow-up assessment and psychosocial support be provided for these employees either in the form of individual counseling, psychotherapy or resilience interventions.

In summary, the study shows the potential for PFA to be facilitated in large groups to address the psychosocial needs, work-related or physical needs of survivors. Thus, rather than viewing post-disaster psychosocial intervention as a one-off activity, it is important that organizations employ a holistic perspective in designing MHPSS program. Although immediate post-disaster interventions are instrumental to short-term mental health, there should be continuing program and service to prevent ongoing stressors to manage long-term mental health status for survivors (Cerda et al., 2013).

References


Further reading

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