EMERGENCY PREPAREDNESS FOR HIGHER RISK POPULATIONS: PSYCHOSOCIAL CONSIDERATIONS

Louise Lemyre[1,2,3,*], Stacey Gibson[1,2], Jennifer Zlepnig[1], Robin Meyer-Macleod[1] and Paul Boutette[1]
[1]GAP-Santé Research Laboratory, University of Ottawa, Ottawa, Canada
[2]School of Psychology, University of Ottawa, Ottawa, Canada
[3]Institute of Population Health, University of Ottawa, Ottawa, Canada

This paper was meant to be on 'vulnerable populations', as some population sub-groups do require special care, special planning and special integration of needs. However, the issue should be reframed in terms of groups *at higher risks*. The text explains how (1) there are contextual vulnerabilities, in (a) higher susceptibility, i.e. higher exposure to risk, (b) higher sensitivity, i.e. higher damage or higher brittleness, and (c) weaknesses and gaps in the emergency system; (2) that these higher susceptibility, sensitivity and system weaknesses involve important psychosocial considerations, which may stem from socio-demographic status or ripple effects in the community; and finally, (3) that addressing those 'soft spots' using the phrase 'vulnerable populations' can be misleading and disserving because it disempowers, stigmatises and deters one from a more thorough analysis.

INTRODUCTION

At initiation this paper was meant to be on 'vulnerable populations', and indeed some population sub-groups do require special care, special planning and special integration of needs. However, the paradigm will be reframed away from vulnerable populations, speaking rather in terms of groups at higher risks. There are three main points to the argument here as follows: (1) there are contextual vulnerabilities in (a) higher susceptibility, i.e. higher exposure to risk; (b) higher sensitivity, i.e. higher damage or higher brittleness; (c) weaknesses and gaps in the emergency system; (2) these higher susceptibility, sensitivity and system weaknesses involve important psychosocial considerations, which may stem from socio-demographic status or ripple effects; and finally (3) that addressing those 'soft spots' using the phrase 'vulnerable populations' can be misleading and disserving.

Emergency events, planning and response

In this paper, the focus is on circumstances under which certain groups of people become more susceptible to experiencing an emergency event as well as more likely to suffer the negative consequences associated with these events. While it is a common belief that disasters are random killers and thus all individuals are equally at risk[1], research has indicated that this is a misconception[2,3]. In actual fact, disasters are both physical and social events, and as such, social preconditions exist that create increased risk for certain groups[4]. This has serious implications for effective planning and policy-making for disaster preparedness and response. The purpose here is therefore 2-fold: to explore the nature of increased risk and which groups are more likely to be at risk, and to illustrate how these differences are implicated in effective planning and policy-making. These objectives will be put in context by a review of the literature on disaster research and the provision of some relevant case studies, including those related to chemical, biological, radiological, nuclear and explosive (CBRNE) events.

THE DEFINITION OF RISK AND VULNERABILITIES

Firstly, a brief discussion regarding the use of the terms 'risk' and 'vulnerable' is required. Risk is usually defined as a function of the *probability* of an event occurring and the *severity* of its consequences[5]. This conceptualisation is commonly applied in risk assessment scenarios, including those pertaining to emergency events, such as natural disasters and man-made disasters, such as CBRNE events.

$$\text{Risk} = \int \text{Prob(hazard)} \times \text{Prob(consequences)}$$

Risk assessment often focuses on the hazard and not the affected population; as such, this conceptualisation of risk has led to an inaccurate belief that events affect all individuals equally, both in exposure (i.e. probability) and outcomes (consequence). However, differential exposure to hazards reflects vulnerability through diverse degrees of 'susceptibility', while differential damage or impact reflects a

*Corresponding author: Louise.Lemyre@uottawa.ca

vulnerability in 'sensitivity'. Some people, either for physiological reasons (child, elderly, pregnant, medicated) or psychological reasons (pre-existing mental health problems, such as depression, anxiety or schizophrenia) demonstrate brittleness and a larger impact. Vulnerability refers to the differential risks in some configurations of contexts or targets.

The semantics involved can be problematic and require some examination. Indeed, the expression *vulnerable population* certainly infers a susceptibility to exposure or negative outcomes; however, it can also suggest an implicit fragility or weakness, a blame or a shame. This negative connotation can create barriers in the effective management of emergency events, in terms of gaining a proper understanding of who is at increased risk as well as a barrier to developing and implementing effective strategies to mitigate the negative outcomes of these events. Therefore, it may be misleading and disserving to use the term *vulnerable population* because (a) it is disempowering and disengaging; (b) it is stigmatising, adds shame or inflicts further damage in that it 'blames the victim'; and (c) it deters one's focus from the conditions and paths that increase the risk. *Vulnerable population* identifies the people, not the contexts. Vulnerabilities may come from the physical or social environments, access to services, pre-existing adversity, resources, and all that contributes to the gradient in health.

In fact, individuals are differentially affected by disasters, either based on factors that impact exposure, such as geographic proximity to the threat; certain socio-demographic characteristics, such as income, age, work status, gender and homelessness[2]; impact sensitivity (age, pregnancy, pre-existing mental illness); via psychosocial considerations too often overseen such as the ripple effect on children and organisational behaviours; fear factor; and perception.

The use of traditional probability/consequence formulae in determining risk for a population neglects to consider the social nature of risk. Risk is not solely an individual consideration; emergency events affect families, organisations, communities and sometimes an entire nation. Risk can also vary not only for individuals, but for groups of individuals as well, i.e. families, organisational units, neighborhoods and ethnic groups. Risk to one individual has an indirect impact on others within the social group. For instance, after the SARS outbreak in 2003, in which health-care workers were particularly susceptible to infection[6], a main concern among these workers was the need to protect their families from infection[7].

As depicted in Figure 1[8], the assessment of risk requires consideration beyond the individuals who are initially exposed or affected.

POPULATIONS AT INCREASED RISK FOR CBRNE EVENTS

The social and multidimensional nature of risk contributes to the ultimate reality that individual risk in disasters is not random, but a product of psychosocial and environmental circumstances. Consequently, it follows that such circumstances actually lead to certain individuals and groups being more susceptible to experiencing emergency events, including CRBNE events as well as experiencing the negative consequences of such events. A summary of which groups are often found at risk in these events is outlined below.

Who is at increased risk for emergency events?

There are a number of groups that have been found to be at increased risk for exposure to, and negative outcomes resulting from, emergency events[2,3,9]. For instance, in a project that combined expert consultations along with literature reviews and analyses, the Canadian Red Cross identified 10 high-risk population groups with regard to emergencies in Canada: seniors, aboriginal residents, low-income residents, persons with low literacy levels, women, transient populations, new immigrants and cultural minorities[10]. Several of these groups have also been identified as higher risk in a number of studies related to natural and man-made disasters[11,12]. A
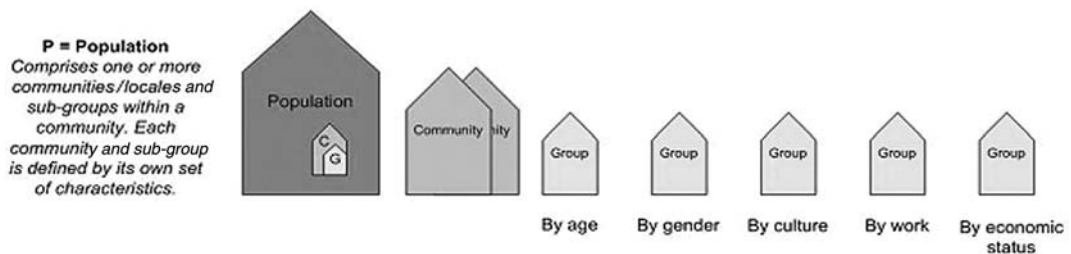

Figure 1. Multidimensionality of individual and group risk as per Lemyre's[8] psychosocial risk assessment and management (P-RAM) model.

description of some of these groups, with relevant examples, is presented below.

The elderly

As noted by several researchers, one's ability to respond during a disaster can be hampered by issues related to older age[12–15]. For instance, the Chicago heat wave of 1995 killed over 700 people in 1 week; 73% of the heat-related casualties were over 65 years old[15]. Similarly, there was a much higher risk of mortality for elderly residents during the 2003 heat wave in Europe[9,16]. In both instances, social isolation and loss of autonomy were reported as important considerations; indeed, as age increases, social networks often decrease[17]. In addition, it stands that some elderly persons may have economic challenges, mobility issues and sensory or cognitive impairments, which might limit their activities as well as their ability to understand and respond effectively to directives[12,13]. While these issues are reflected in varying degrees among elderly individuals, they remain worthwhile considerations. Thus, the elderly are at higher risk because of higher fragility and because of difficult access to care or lower social networks.

Pregnant women

Emergency events that pose a physical threat to individuals create a further risk for pregnant women and their unborn children, as certain types of events can cause added concern if the source is even potentially dangerous to fetal development. These consequences can be direct or indirect. For example, immediately following the 1986 Chernobyl nuclear disaster, induced abortions in some western European countries increased by 60%, in response to the augmented stress and worry over congenital defects[18]. However, subsequent research revealed that no increase in such defects occurred, and many of these abortions were deemed unnecessary[18]. The risk of these outcomes is particularly salient in the case of CRBNE events. Impact on pregnancy was also demonstrated after the ice storm in Quebec with higher rates of prematurity, lower birth weights and developmental delays, most likely induced by stress. Vulnerability, or higher risk, in pregnant women can be related to both physiological sensitivity to agents and products, and psychological stress.

Children

Children are at increased risk to both physical and psychological consequences of emergency events. For example, children are physiologically more susceptible to negative reactions from chemical and biological agents, and their ability to respond in a disaster is also influenced by their developmental limitations[18]. Additionally, children are more susceptible to negative psychological outcomes following emergency events, as reported following natural disasters and terrorist attacks[18–20]. Here, higher risk is linked to the sensitivity to the dose, special tissue and mental health.

Individuals with mental or physical impairments

Disabilities can restrict individual and household options, which can increase an individual's exposure to certain events, and can lead to a greater dependency on outside help when responding to an emergency[14]. While there is little empirical literature on preparedness and response regarding those with physical disabilities, anecdotal evidence following events such as Hurricane Katrina and 9/11 shows that people with disabilities are often left behind because response efforts are not designed to accommodate their needs[21]. Pre-existing conditions therefore affect both susceptibility and sensitivity.

Low-income individuals

Individuals and families with lower incomes are at higher risk for exposure to certain emergency events, since they have an increased chance of living in less disaster-resistant dwellings and often live in closer proximity to disaster-prone areas[22–24]. For example, following Hurricane Andrew, it was reported that mobile homes were 21 times more likely to be destroyed than conventional homes[23]. In turn, poor individuals are also at higher risk for mortality and injury, and disruption of livelihood following these events [22,24,25].

Cultural/ethnic minorities

While there is great variation in the experiences of diverse cultural minority groups, it stands that some individuals who identify as cultural minorities suffer greater exposure to, and consequences from, disasters[26]. It is worth noting that for some groups, recurring patterns of discrimination and lack of political empowerment also lead to economic disadvantage, and the accompanying risks regarding disasters[14]. For instance, after Hurricane Katrina passed, the Lower Ninth Ward in New Orleans (a significantly impoverished community) had a disproportionate number of fatalities, and the highest concentration of homes that were unsafe to enter during recovery efforts[27].

Workers

The above sub-groups are more often represented as the victims of emergencies, direct or indirect bystanders. However, another group that is largely at

higher risk during emergencies are workers: first responders of course (fire, police, paramedics), but also the full cadre of health providers, plus the utility technicians, equipment operators, transport drivers, public receptionists, journalists and not to forget decision-makers who endure high stress and sustained response.

PSYCHOSOCIAL CONSIDERATIONS

As previously mentioned, at-risk populations vary depending on the nature and intensity of the event as well as the socio-demographic characteristics of the affected community. Further psychosocial considerations, including risk perception and risk communication, may also contribute to the variability in at-risk populations. As such, these factors, which play a vital role in emergency preparedness and planning, warrant consideration with regard to at-risk populations.

Risk perception

Risk perception influences how people behave and respond to a hazardous event. Indeed, individuals must first *believe* that the hazardous threat is valid, if they are to respond at all. Consequently, risk perceptions can affect the acceptance of warnings and evacuation orders as well as recommendations from public officials and emergency planners. This is particularly salient when considering at-risk groups, since some research indicates that group differences in risk perception do exist for various hazard scenarios involving at-risk groups such as lower income individuals, visible minorities and women[11,28,29]. For instance, Finucane et al.[29] examined cross-cultural and gender differences in risk perception related to a variety of hazards, including natural disasters, food hazards, nuclear power plants and stored nuclear waste. Results indicated that women and visible minorities were more likely to rate the hazards as 'high', while Caucasian males perceived the lowest risk on every item[29]. These findings are consistent with gender and cross-cultural differences that were found in a number of previous studies[30–35].

The possible reasons for this discrepancy in risk perception are complex. While differences in risk perception among groups may be linked to hazard exposure[36], there is evidence that suggests that the credibility of related risk messages may also influence the perception of risk. In a national study on Canadians' perceptions of terrorism threats in Canada, Lee et al.[37] found that certain dimensions of trust—specifically, integrity, transparency and benevolence—were found to be positively associated with perceived threat and subsequent preparedness. Trust has likewise been associated with perceived risk for various hazards in a number of additional studies [see refs (38,39), for reviews]. Lack of trust in information about SARS for example, has to be considered as a vulnerability factor.

Differences in risk perception among groups have not been consistently reported in the literature. However, it needs to be considered in the context of effective planning and response, especially with regard to at-risk groups. People need to perceive the threat and need for action. As noted above, one dimension of risk perception is related to the manner in which messages are received by the individual. This process, linked to risk communication, is another important element in effective emergency preparedness, and is outlined below.

Risk communication

Risk communication is an interactive process, involving the exchange of information and opinions among individuals, groups and institutions regarding potential health or environmental threats[40–42]. Strategies for risk communication are essential for effective response and for the protection of the public in the event of a CBRNE attack, or other emergencies, including natural and technological disasters[43] Unfortunately, effective risk communication is not always utilised prior to an emergency event because of uncertainty surrounding the event or a fear of public panic. Recent examples of this type of miscommunication include Hurricane Katrina and the Indonesian Tsunami, where the consequences were beyond devastating.

Failing to communicate risks and uncertainties is detrimental to the general population, and shall be considered vulnerability in the preparedness emergency plans here and in particular to those who are more susceptible to hazard exposure and outcomes. An example of this type of miscommunication comes from the Chernobyl nuclear disaster. After the explosion on 26 April 1986, there was no official information about the accident released by the government and the first indication of a major nuclear accident did not come until 2 days later in Sweden[44]. A number of studies have shown that the initial lack of information as well as the ambiguous and conflicting nature of the communication that did follow, failed to meet the needs of the most affected groups, such as those individuals living in close proximity to the nuclear power plant[37,45–48].

Furthermore, even when risk communication strategies are put into place, these communications are often directed towards the general population and do not take into account the unique needs and concerns of those population groups who are more at-risk [43]. Thus, there is a need to develop risk communications that are targeted and tailored to the various groups within a community, particularly those groups that are more at risk.

IMPLICATIONS FOR PLANNING

Throughout this paper it has been emphasised that certain groups are not simply *vulnerable* to the effects of disaster—rather, there are a number of pre-existing factors that determine which groups will be more at risk during an emergency, including the characteristics of the hazard and the socio-demographics of the affected community. Furthermore, psychosocial factors such as risk perception and risk communication also play a role in the augmentation of risks. All of these factors have strong implications for planning: indeed, understanding that differences exist, and the mechanisms which contribute to the amplification or diminution of these risks, can help to mitigate the effects of disasters for at-risk populations, thereby improving disaster preparedness and response efforts. Two ways in which planners can address these issues effectively before an emergency include identifying at-risk factors, and including them in the planning process. A summary of these strategies is described below.

Mapping communities

As a first step in planning, there is a need to map individual communities and conduct vulnerability inventories, sometimes referred to as a community hazard and risk assessment[49] or an access profile[2,50] Vulnerability inventories are an essential planning tool that will allow emergency managers the opportunity to locate, collect, examine and act upon their community knowledge about the most likely hazard sites, most likely targets and those groups who may be differentially affected by emergencies or who may be more susceptible to these events[10]. The resulting *Community Vulnerability Maps* are valuable tools for emergency planners and disaster responders because they will provide informed estimates of anticipated community needs at all levels of emergency response[23]. The next step, according to Morrow[23], is to incorporate educational initiatives, mitigation programmes, evacuation plans, the distribution of humanitarian relief and other critical response services.

Vulnerability maps should also 'identify community resources, such as shelters, community centres, local service groups and neighbourhood response networks'[23]. As an example, Odeh[51] describes a vulnerability assessment model that was recently applied to the state of Rhode Island for use in statewide disaster mitigation planning. The assessment identified at-risk populations as well as the frequency and types of hazards in a given region over time. The results of the assessment have been used to develop the state mitigation plan, strengthen initiatives to adopt new building codes with improved hazard-map provisions and guide and prioritise the creation of community-specific mitigation plans in regions that are most at risk[51]. Furthermore, this process also facilitated improved communication and information sharing between key stakeholders within the state[51].

Community engagement

Community engagement is another strategy that will inform and enhance emergency planning for at-risk populations as well as contribute to more effective risk communication. Community engagement is defined as structured dialogue, joint problem-solving and collaborative action among authorities, citizens at large and local opinion leaders around a pressing public matter, such as disaster planning for at-risk populations[52]. This dialogue can and should address both physical and psychosocial resources required to assist these groups in an emergency situation: for instance, in their content analysis of federal, provincial and municipal emergency plans following the 2003 SARS outbreak, O'sullivan *et al.*[7] noted that while physical and instrumental needs of health-care workers were included in future planning, psychological and emotional supports were severely lacking[7]. As such, community engagement can serve to fill the existing gaps in planning strategies for at-risk groups.

Although at-risk populations are often considered to be 'special' groups with unique dependencies and greater needs for assistance in emergencies, these individuals are also key planning partners for emergency managers[10]. More than anyone else, at-risk populations can offer valuable insights to the planning process, since they are best able to identify their specific needs and the challenges and barriers that they face in emergency situations. For instance, low-income individuals are more likely to have experience with substandard living conditions. Moreover, members of these populations also have a wealth of information on surviving in extreme situations: refugees and the elderly are more likely than the general population to have had experience with various disasters, for example. Thus, the insights that these groups have in surviving hardships could help develop effective coping strategies and emergency plans. Overall, working closely with at-risk populations will enable more effective and efficient emergency response, and will ultimately help to develop more disaster-resilient communities.

Community engagement is also beneficial to the process of risk communication. Essentially, risk communication should include strategies that encourage discourse about potential hazards and that facilitate the public's active involvement in developing and implementing sustained mitigation practices. For instance, emergency planners should take part in discussions within established community environments

(e.g. religious groups, social action groups, schools, retirement and nursing homes, community centres and health centres) in order to interact with the various population groups and determine the needs of each group (D. Paton, unpublished results)[53,54]. Community engagement provides information, increases preparedness, develops networks and rehearses scenarios.

It also helps to pre-identify barriers. The following are examples of risk communication barriers for at-risk populations[55]:

- Certain populations, such the economically disadvantaged, may not have access to telecommunication devices, such as televisions, radios, telephones or the Internet (Texas Department of State Health Services, unpublished results).
- Existing written materials on disaster preparedness may not be comprehensible for low-literacy populations.
- Linguistically and culturally appropriate information for populations with limited English competency may be unavailable.
- Materials may be inaccessible to those in remote or rural areas, or those who are unable to travel to where materials are distributed.
- Undocumented workers or immigrants may be reluctant to seek official sources of information or assistance for fear of deportation or other repercussions[56].
- Materials may be limited or unavailable in needed formats such as Braille, large print or audio files.
- Older persons living alone may lack social support networks to provide help in an emergency, over and above what is needed in non-emergent times.
- At-risk populations may not know where to go for health information, especially if they do not receive regular health care[57]. Newcomers, immigrants, visitors and the homeless also fall in this category.

In addition, community engagement tends to establish and reinforce bonds between various community groups. For instance, engagement of local community networks will assist in ongoing communication and education efforts with at-risk populations[55]. Furthermore, community engagement will build and strengthen trust between public authorities and citizens—a factor that is crucial to effective communication and planning. Indeed, research indicates that trust is a crucial component of risk communication and disaster planning, since people are more likely to accept risk communication messages and follow recommendations from authorities whom they perceive as credible, trustworthy and empathic[58–62]. In addition to trust, satisfaction with communication, risk acceptance, willingness to take responsibility for one's safety and collective commitment to confront hazardous consequences will also increase.

Finally, community engagement also tends to instil feelings of empowerment and self-efficacy in participating citizens. Essentially, if at-risk populations feel empowered and get to be better informed, then they will be more likely to plan and prepare for a potential threat because they will have the knowledge and resources available to do so. These groups will also be more likely to take appropriate and effective action in the event of an actual emergency.

CONCLUSION

In summary, emergency planning often either overlooks at-risk populations because hazards are thought to affect everyone equally, or stigmatises and disempowers target groups by characterising them as vulnerable, therefore weak and helpless, populations. In reality, indeed some groups are more adversely affected by extreme events than others because they are more exposed or less equipped to face adversity. Psychosocial considerations such as risk perception and risk communication can be used to address the limitations in planning for at-risk populations. Risk perceptions differ depending on a population's prior experience to the hazard as well as the trust they place in risk messaging. Risk communication, which addresses the information needs of all at-risk populations, can accommodate the population differences in risk perception. Importantly, such risk communication is two-way in nature; it requires a dialogue between planners and the public. Consequently, community mapping and community engagement should be fostered to address the specific needs of a community, to empower its members and to increase their trust in risk messaging. Until now most research on emergency situations has focused on the hazards and not the populations. Planning that recognises that risk is manifested socially as well as physically will ensure the best emergency response where it is most needed.

FUNDING

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