

## An Examination of the Pedestrians' Status of Awareness at Disaster Events

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| Received: 05.03.2019 | Accepted: 12.03.2019 | Published: 30.03.2019

DOI: [0.21276/sjahss.2019.7.3.14](https://doi.org/10.21276/sjahss.2019.7.3.14)

### Abstract

### Original Research Article

The objectives of this research are to understand pedestrian's behaviour at a disaster event, to find out pedestrian's priorities in a disaster event and to identify important pedestrian facilities for disaster events. The research is carrying out by collecting primary data first from the victims and then from pedestrians at disaster events by using cards carrying out stated preferences surveys. The overall survey included different instruments, distinguished based on the attributes characterizing disasters. Each instrument considered only three or four attributes, so that respondents are able to easily comprehend and evaluate the scenarios presented to them. The hypothetical disaster occurrence scenarios within each instrument generate by varying the levels of the attributes specific to that instrument. A statistical analysis of experienced event and an experimental design for the hypothetical events were carried out. The results highlighted that pedestrian have no idea when faced by an unfamiliar disaster event. Lack of awareness need to be strengthened to minimize adverse effects from the disaster event. This research helps decision makers to understand the most important factors to be considered when providing pedestrian facilities at the area.

**Keywords:** Walking, pedestrian's behaviour, Pedestrian facilities, Statistical analysis, Scenarios, Instrument.

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## INTRODUCTION

Nowadays we can observe a dramatic increase of the disaster events. In order not to be susceptible to the disaster situations it is mandatory to understand pedestrians' behaviour to disaster events. Analysis of public behaviour plays an important role in crisis management, disaster response, and evacuation planning. In this context generally weather hazards to avoid when walking include rain, snow, ice, hail, lightning, strong winds, fog, and other harsh weather conditions. High altitudes and darkness can also curtail the outdoor walking. With a little bit of skill, however, a person may be able to walk around these hazards. In Sri Lankan context, citizens only experienced rain, lightning, strong winds, flooding and Tsunami up to now. This research tries to find out the response of pedestrians in known and unknown disaster events.

Pedestrians are often unaware of the risks posed by disaster events. Some studies have compared people's risk perceptions in relation to a number of hazards (e.g., floods and landslides) [1-3]. But to date it appears no studies have examined how people's experiences of different types of disasters in Asian context. In order to give context to the research, a review of the experiences for people exposed to

disasters was done. Secondly, a description of the experimental set-up, including measurement techniques, experimental campaign and protocol adhered to, and variances in the investigated pedestrian characteristics. Finally this paper presents the obtained results and an extensive discussion of them by comparing with the results of other authors which lead to the conclusions.

## LITERATURE REVIEW

Pedestrian's safety can be compromised when they are exposed to flows that impede their ability to remain standing or to securely traverse a street or a natural stream. The natural disasters considered ie. Flooding, Tsunami and High wind events and hypothetical events like earth quakes review on these disaster events were done.

Urban floods are sudden phenomena normally characterized by short flooding durations and devastating effects due to the high concentrations of persons, goods and properties located in urban areas. In these cases, uncontrolled runoff can flow on urban streets, creating a significant hazard for pedestrians and vehicles. Furthermore, human activity in runaway is inevitable in developed flood prone areas. In these situations, people's safety can be compromised when they are exposed to flows that exceed their ability to

remain standing or to traverse a flow path. Research undertaken in Richmond, Windsor, Woronora and Lismore reported that 50% of respondents considered it safe to walk or drive through six inches of water [5]. People are often unaware of the risks posed by floods despite living in flood prone areas and even those who are aware, significantly underestimate the potential impacts, are not concerned about the risk, or believe that a flood event will not personally affect them [5-7]. The velocity and depth of floodwater at any given location also influence the stability of Pedestrians [8, 9, 10-12]. To date there have been only a small number of studies that have examined people's behaviour in and around floodwater. These studies can be divided into two types. First, a number of studies have presented participants in their studies with a hypothetical situation and have then asked how they would behave under the circumstances [5, 6, 13, 14, 15, 16]. The major limitation of such studies is that they do not observe actual behaviour (only 'imagined' behaviour) and as a result may not reflect how people actually behave in a hazardous situation. Second, recognising the inherent weakness in the first approach, a few studies have sought to observe and understand people's actual behaviour during a flood event [17-20].

Studies of risk perception examine the judgements people make when they are asked to identify and assess hazardous processes, activities and technologies [21, 22]. These studies seek to examine what people mean when they say that something is, or is not, 'risky' and to establish which factors influence those perceptions [21]. The study of risk perception has emerged mainly as result of the observation that there are significant differences between experts' 'objective' assessments of risk, and lay persons' intuitive judgements of risk [1, 21].

Risk perception research has highlighted that a person's view of the risk posed by any hazard including flooding is shaped by a variety of different personal, social, cultural, and political factors [23, 21, 22]. At the individual level these include a person's knowledge, experience of, and perception of the immediacy of the hazard threat [24, 25], as well as by people's values,

attitudes, and biases [26, 27]. For example, an individual's perception of risk can be influenced more by personally salient issues (i.e., perceptions of the risk posed to their own health and safety or their property) than by the actual level of risk associated with any given hazard [26]. On a broader scale, people's views can be shaped by the views of their friends, family and colleagues, how the hazard is portrayed by experts, the mass media and government agencies, and the degree of trust they place in these people and institutions [25, 16, 21, 22].

## METHODOLOGY

Research carried out by collecting primary data first from the victims of the flooding, high wind and tsunami situations. This was done with a sample of 200 respondents. Once those experiences were gathered next step is to carry out stated preferences surveys. This SP survey was done for a 110 sample. Stated preference surveys present the respondent with a series of hypothetical choice situations, and obtain the respondent's choice responses. The SP survey conducted in this research was designed to obtain information on pedestrian responses to unknown disasters namely earth quake and tornado. The overall survey included five different instruments, distinguished based on the attributes characterizing routes. Each instrument considered only two or three attributes, so that respondents are able to easily comprehend and evaluate the scenarios presented to them. The hypothetical route choice scenarios within each instrument were generated by varying the levels of the attributes specific to that instrument.

## RESULTS

First the perception of the experienced pedestrians were analysed. 54% of respondents considered it safe to walk cautiously through three inches of water. Experienced respondents argued that their attempt is priority based. Following gives the priority of activities as per their ranking. This argument and responses lead to the identification of the attributes for the experimental design.

**Table-1**

Activity	Importance	As a % of Total
Travelling to and from work	2	37%
Picking up or dropping children from school	1	64%
Carry on daily schedule as usual	3	40%

**Table-2: Experimental Design used for the hypothetical scenarios**

Variable Type	Variable or attribute	Levels
Earth Quake / Tornado	Knowledge	4 levels No idea, little understanding, heard, know it
	Safety	3 levels Safe, Not Safe, No idea
Priority	Daily work	4 levels Stop walking, Continue walking, Run for safety , no idea
	Children	3 levels Go for them, worry about their safety, no idea
	Walking Environment	3 levels Not supportive, supportive ,no idea
	Personal safety and security	3 levels Not safe, safe, very safe

When analyzing the SP survey results it can be identified that all the six attributes have a statistically significant effect on safety. Negative signs on the knowledge level is a critical issue identified as the response indicate the over estimation of the disaster not

happening. The negative signs on the walking environment and safety indicate that people are more concerned about their safety. However the grave concern was with regard to their children's safety.

**Table-3: Main affects model**

Variable Type	Variable class	Variable Levels	Coefficient	t-statistic
Earth Quake / Tornado	Knowledge (base: no idea)	Will occur	1.54	14.18
		Will not occur	-1.86	-13.25
Priority	Safety (base: not safe)	Safe	-0.43	-1.84
		Not safe	1.42	11.58
	Daily work (base: no idea)	Stop walking	0.17	3.63
		No idea	1.53	12.56
Walking Environment (base: no idea)	worry about their safety	Not supportive	0.94	4.31
		no idea	-2.37	-9.62
Personal safety and security (base: not safe)	Not safe	safe	-1.61	-11.73
		safe	0.03	2.46

The results indicate that people are underestimating disasters happened and overestimating non-occurrence of other disasters. This is an alarming condition need to consider seriously.

## CONCLUSION AND DISCUSSION

This study indicates that people are often unaware of the risks posed by current disasters despite their experience and even those who are aware, significantly underestimate the potential impacts, are not concerned about the risk, or believe that these events will not personally affect them. In Sri Lanka, people give first priority for the safety of their children than themselves. Their attitude needs to be changed and they need to be health conscious as well.

In case of hypothetical events, results highlighted that pedestrian have no idea and they are over estimating that these disasters will not happen.

Lack of awareness need to be strengthened to minimize adverse effects from the disaster event. In addition certainty of disasters not happening sense need to be eradicated as one cannot predict natural hazards. This research helps decision makers to understand the most important factors to be considered when providing pedestrian facilities at the area. Further research is needed to investigate people's understanding of, and decision-making around, information related to stability in floodwater, High wind, Tsunami or unknown disaster occurrences.

## Acknowledgements

The research study was funded by the Senate Research Grant, University of Moratuwa

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