

**DISASTER PREPAREDNESS BY LOCAL GOVERNMENT: A CASE STUDY OF
FOREMAN AND KENNEDY ROAD INFORMAL SETTLEMENTS IN THE ETHEKWINI
MUNICIPALITY**

Bethuel Sibongiseni Ngcamu

Mangosuthu University of Technology-Department of Human Resource and Development

Dr. N. Dorasamy

Durban University of Technology-Department of Public Management and Economics

ABSTRACT

Disaster preparedness is one of the phases within the disaster management cycle which covers implementation or operation, early warning systems and capacity building so that the population can react appropriately when an early warning is issued. Disasters have inflicted a heavy cost on human, material and physical resources. A comprehensive review of the literature has revealed that the development of disaster management strategies, such as preparedness, must be undertaken before the event strikes.

The purpose of the article is to contribute to the development of a robust disaster management policy and the centre within the eThekwini municipality. Furthermore, this article intends to enable the disaster management department within the municipality to function effectively and efficiently by applying new strategies for disaster preparedness and to add value to the body of knowledge in South Africa as there are a limited number of researchers who have contributed to the study of disaster management.

The research was undertaken at the Foreman and Kennedy Road informal settlements located in Clare Estate, under Ward 25, in Durban. Questionnaires were self-administered to a population size of 220 respondents from which a sample size of 140 respondents completed the questionnaires, thereby generating a response rate of 63.6%. Interviews were also conducted with municipality officials involved in disaster management. There are two categories of data collected that include biographical profiles (age, gender, marital status, education, occupation, income, number of children, race and tenure) and disaster preparedness. Data was analysed in the form of frequency distribution and cross-tabulation tables.

INTRODUCTION

Developing countries, such as South Africa, have often failed to implement disaster management strategies such as preparedness. Political neglect, social marginalization and limited access to resources compel helpless people to live and work in hazard-prone areas. Drawing on cases from the developing world, scholars such as O'Keefe, Westgate & Wisner (1976:45), Hewitt (1983:45) and Wisner, Blaikie, Cannon & Davis (2004:65) argue that people's behaviour in the face of natural hazards is constrained by social, economic and political forces rather than individual risk perception. Government is accountable to citizens for quality service delivery such as housing provision. The Constitution of the Republic of South Africa, 1996 (chapter 7:152), requires local government as a sphere of government to provide democratic and accountable government to local communities, ensure the provision of services to communities in a sustainable manner, promote social and economic development, promote a safe and healthy environment; and encourage communities and community organisations in matters of local government (Armstrong, 2005:2). Government accountability to all citizens translates to improving the lives of the poor and the vulnerable. Local governments require the assistance of structures involving all disaster practitioners and specialists dedicated to monitoring and improving disaster preparedness approaches.

The Foreman and Kennedy Road informal settlements are prone to emergencies and disasters such as floods, fires and storm surges which negatively impact on people living in these vulnerable areas. International experiences of disasters depict that different countries are struck by floods, earthquakes and volcanoes. International declarations and proposals by the United Nations Development Programme and other organisations dealing with disaster risk reduction plays a tremendous role in disaster preparedness. Furthermore, the role of non-governmental organisations (NGOs), such as the International Red Cross and the role played by the United States of America (USA) in disaster preparedness, assist countries struck by catastrophies with preparedness strategies.

If disaster frequency is to be reduced, then safety must also be sought as a major goal in comprehensive strategic planning to reduce disasters. Disaster identification and reduction at an international level and national level must be supplemented by local activities. The Centre for Research on the Epidemiology of Disasters (2006:1) states that, disaster preparedness often fails because it is rarely evidence based. It suggested that more scientific studies are needed to improve the effectiveness of disaster preparedness and prevention. Some disasters can be avoided and

minimized through enhancing the national disaster management capacities to address the various aspects of prevention, preparedness, mitigation, response, rehabilitation and recovery. Holloway (2003:34) argues that disaster risk reduction is the systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout society to avoid (prevent) or limit (mitigate and be prepared for) the adverse impact of hazards, within the broad context of sustainable development. Haddow & Bullock (2006:167) emphasise that there are three sets of actions that can reduce losses. These actions are hazard mitigation, emergency preparedness and recovery preparedness practices.

This article seeks to investigate disaster preparedness within eThekweni Municipality. The fragmented management of disaster actions such as preparedness has contributed to unnecessary morbidity, mortality, and a waste of resources. However, some disasters can be avoided and minimised by enhancing the national disaster management capacities to address the various aspects of preparedness. Informal settlement growth in metropolitan areas of South Africa has increased in the past decade as a result of the abolishing of legislation implemented by the apartheid government that prevented urbanisation (Ferreira, de Meyer, Loots & Keyise, 2002:23). The article will explore whether disaster preparedness strategies are adequately implemented in informal settlements with the aim to avoid, prevent and mitigate the impacts of disasters.

Previously, preparedness strategies were ignored because disaster management was responding to and recovering from the disaster impact as disasters were governed by reacting Civil Protection Act 67 of 1977 and the Fundraising Act 107 of 1978. Thus, with the enactment of the Disaster Management Act 57 of 2002, disaster preparedness ensures that appropriate systems, procedures and resources are in place to provide effective assistance to disaster victims, thus facilitating relief measures and rehabilitation services. The focus of disaster management is to reduce the risk posed by actual and potential hazards. Hazards can be broadly grouped into three areas such as natural, technological and complex emergencies (Alexander, 2002b).

Global approach to disaster management

Disaster management strategies are traced back to antiquity when early hieroglyphics depict cavemen trying to deal with disasters. The Holy Bible speaks of the many disasters that hindered civilisations. Haddow and Bullock (2006:1) mention the account of Moses parting the Red Sea which can be interpreted as the first attempt at flood control. Genesis 6 verse 14 (Zodhiates, Baker and Kemp, 1996: 10) speaks about Noah and the Ark, when he built an ark from cypress wood, coated it with pitch inside and out,

as a mitigation strategy for the forthcoming predicted floodwaters. Moreover, the holy Bible speaks of many disasters that hindered civilisations.

Early disaster management strategies include inter alia, the promulgation of the United State of America (USA) Congressional Act of 1803 which was passed to provide financial assistance to a New Hampshire town that had been devastated by fires (Haddow *et al.*, 2006:2). Another notable example is that of the cold war era where the nuclear war was seen as a potential disaster threat. Disaster preparedness attempt to forecast extreme events, attempt to mitigate the impact of disasters, respond to disasters and cope with consequences of disasters. Strategies for disaster preparedness include awareness of event that is most likely to happen at a particular time and at a specific geographical location, risk and vulnerability assessment, response mechanisms, coordination, information management, and the implementation of early-warning systems International Federation of Red Cross and Red Crescent Societies (IFRC), 2000:34).

Allen (2006), *cited in* Yohe, Lasco, Arnell, Cohen, Hope, Janetos & Perez (2007:820) indicates that the bottom-up approach to disaster risk reduction is based on enhancing the capacity of local communities to adapt to and prepare for disasters. Actions in this approach include dissemination of technical knowledge and training, awareness raising, accessing local knowledge and resources, and mobilizing local communities. Blanco (2006), *cited in* Yohe *et al.* (2007:820), attests that climate change can be incorporated in this approach through awareness and the transmission of technical knowledge to local communities. Bridging the gap between scientific knowledge and local application is a key challenge.

The International Federation of Red Cross and Red Crescent (2000:6) indicate that vulnerability analysis is useful because information is needed in the pre-disaster phase including collecting and analysing information necessary for preparedness planning. The International Federal of Red Cross and Red Crescent Societies (2000:6) indicate that disaster program planners increasingly use vulnerability information to refine their preparedness plans. Furthermore, vulnerability analysis ideally provides indications of where the effects of disasters are likely to be the most pronounced (for example, by region and population). It is important for development planners to make some effort to quantify the tangible aspects of vulnerability and loss to assist preparedness planning. Local experience is a good guide to what is vulnerable in a society, and the list of potentially vulnerable elements should be supplemented by a study of written reports and the knowledge of those who lived through previous disasters (Coburn, Pomonis, Sakai & Spence, 1991:32). This

indicates that tacit (indigenous) knowledge received on previous disasters in a particular area needs to be recorded and converted to explicit knowledge for future use.

In this regard, Coburn *et al.* (1991:33) point out that assessment includes the following two general categories of information:

- Static infrastructure information that provides the basis for determining the extent of development, types of physical advantages and disadvantages faced by communities residing in an area, and a “map” of available structures (such as roads and hospitals) that might be useful in times of emergencies; and
- Relatively dynamic socioeconomic data indicating causes and levels of vulnerability, demographic shifts and types of economic activity.

International agreements, such as the International Decade for Natural Disaster Reduction 1990-1999 (IDNDR), Yokohama Strategy (1994), International Strategy for Disaster Reduction (ISDR), Hygo Framework for Action (2005-2015), and Disaster Reduction and Recovery Programme (DRRP), emphasise the importance of disaster preparedness. The United Nations (UN) promotes preparedness, prevention and mitigation activities through its regular development projects. The UN is encouraging the building of early warning systems and conducting monitoring and forecasting routines which are working to increase local capacity to adequately boost local and regional preparedness (Haddow *et al.*, 2006:222).

In developed countries, the social implications of disasters are not severe because disaster management and disaster risk-reduction strategies are in place. For instance, the Tulsa Safe Room programme provided mitigation and preparedness in the United State of America (USA). The Federal Emergency Management Agency (FEMA) and private organisations funded the building of safe rooms to provide shelters during tornadoes as a preparedness and mitigation strategy. Another case is the implementation of disaster risk reduction which is risk assessment. In the case of the relocation of the Castaic Union school district in the USA, which was previously located at the earthquake belts zone and also built below the dam and the reservoir, it was later relocated to the less vulnerable area (Haddow *et al.*, 2006:223). In developed countries, there are also good public-private partnerships which help for disaster preparedness and mitigation programmes.

Disaster preparedness and informal settlements

Informal settlements are deemed by the United Nations as areas where groups of housing have been constructed on land to which the occupants have no legal claim. These areas are characterised by rapid, unstructured and unplanned developments. They are common features of developing countries and are typically the product of an urgent need for shelter by urban poor (Huchzermer, 2001; Mason & Baltasvias, 1997 & United Nations, 2004). According to information from the South African 1996 census, 11, 6% of households lived in freestanding informal settlements, and a further 4.5% lived in shacks in the backyards of formal houses in townships. Over 16% of households were living in urban informal housing, and a further 18% lived in traditionally constructed houses which would be located mostly in rural areas. Napier & Rubin (2002:4) argue that these figures are only broadly indicative of exposure to risk, because the location of the settlements and the quality of the construction materials are not all evident. Informal settlement growth in metropolitan areas of South Africa has increased in the past decade as a result of the abolishing of legislation implemented by the apartheid government that prevented urbanisation (Ferreira *et al.*, 2002:23). As a result of the sudden post-apartheid increase in urbanisation, metropolitan areas in South Africa were very dynamic, resulting in the rapid change of the spatial patterns and land use associated with such areas.

The 11.6% households living in freestanding informal housing are most often located on the far distant peripheries of cities (SA Census, 1996). Vulnerability to disaster is increased as a result of certain qualities of the location, such as settlements on steep slopes (Inanda, Durban), within flood plains (Alexandra, Johannesburg), close to mine dumps (East Rand, near Johannesburg), close to heavy industrial areas (Wentworth, Durban), or even on landfill sites (Foreman and Kennedy Road, Durban). Other hazards arise from the nature of the settlement itself, such as risks of rapidly spreading fire, or health risks from rising dampness, poor indoor air quality and collapsing structures.

According to the National Disaster Management Centre (NDMC) (2006/2007:12-13), natural disasters such as devastating floods, violent hailstorms, heavy snowfalls and gale-force winds are regular occurrences in South Africa. The South African Weather Service maintains a record of significant weather events of the past and captures information such as the actual date of occurrence, the extent of the damage and areas affected, as well as the frequency of a particular type of disaster occurring in a specific region. Such records are essential to government departments

dealing with the implementation of disaster management strategies (such as prevention and preparedness) in vulnerable areas.

There are four parts to a preparedness programme which encapsulates planning, training and education, resource management and exercising, which refers to the physical training of the personnel such as fire marshals. Bullock & Perry (2000:34), cited in Haddow & Bullock (2007:168), found that another way to reduce a disaster's physical impact is to adopt emergency preparedness practices, which can be defined as pre-impact actions that provide the human and material resources needed to support active responses at the time of the hazard's impact. According to Wu & Lindell (2003:2), community protection works include dams, levees, and drainage systems that protect an entire area from the hazard's impact. Community protection works are most commonly used to divert floodwater past communities that are located in floodplains. They also can be used to provide protection from other types of water flows such as tsunami and hurricane storm surges (Haddow & Bullock, 2007:196). eThekweni municipality is dominated by a very high density of drainage system whereas its geographical location is in a valley flow and large numbers of houses are built on the floodplains without any community protection works, especially in poor informal settlements. Haddow & Bullock (2007:196) argue that community protection works can protect against two types of geophysical hazards: landslides and volcanic lava flows, and some industrial hazards. They further list four types of flood control works which are stream channelisation, dams, levees and floodwalls (Haddow & Bullock, 2007:196-197).

Disaster preparedness within the context of disaster management

According to Col (2007:115), preparedness is the state of readiness to respond to an emergency based on planning, training, and exercise. The concept of disaster preparedness encompasses measures aimed at enhancing life safety when a disaster occurs, such as protective actions during an earthquake, hazardous materials' spill, or a terrorist attack. It also includes actions designed to enhance the ability to undertake emergency actions to protect property and contain disaster damage and disruption, as well as the ability to engage in post-disaster restoration and early recovery activities (Tierney & Sutton, 2006:3). With regard to management response, the Manitoba Health Department (2002:29) mentions the following two aspects of preparedness:

- emergency response plan which deals with meeting the special demands created by an impact on the community; and
- business continuity planning to ensure services are maintained when the organisation is negatively affected by disasters, even if the effects are limited to internal disruptions.

Emergency response planning deals with how the municipality will help its clients cope with the extraordinary demands that a disaster creates. In contrast, business continuity planning deals with how the municipality copes with the impact of the disaster with its own systems and resources (Manitoba Health Department, 2002:30).

Another component of response preparedness is to bring the skills, knowledge, functions and systems together and apply them against event scenarios (Manitoba Health Department, 2002:31). This means that all government departments and different stakeholders should meet and integrate their knowledge and expertise in preparation for any catastrophe. Furthermore, private and public organisations should prepare their internal disaster management pro-active plans with the aim of avoiding or mitigating any risk or disaster. The recent earthquake that devastated Haiti resulted in an estimated 230 000 deaths with many more people left injured and displaced. The tragic situation in Haiti has raised key issues on the preparedness of South Africa's disaster management departments in dealing with these catastrophies, particularly at the municipality level.

In the South African context, the term 'disaster risk management' refers to the integrated, multi-sectoral and multidisciplinary administrative, organisational, and operational planning processes as well as capacities aimed at lessening the impact of natural hazards and related environmental, technological and biological disasters. According to the South African Disaster Management Act 2002 (57 of 2002), disaster management means a continuous and integrated multi-sectoral, multi-disciplinary process of planning and implementation of measures aimed at preventing or reducing the risk of disasters, mitigating the severity or consequences of disasters, emergency preparedness, a rapid and effective response to disasters and post-disaster recovery and rehabilitation. However, the terms disaster risk management and disaster management are used interchangeably in this article (NDMC, 2006/2007:12).

The Disaster Management Act 2002 (Act 57 of 2002) gives priority to the application of the principle of cooperative governance for the purpose of disaster risk management and emphasizes the involvement of all stakeholders in strengthening the capabilities of national, provincial and municipal organs of state to reduce the likelihood and severity of disasters. The Department of Agriculture has rolled out an awareness programme to raise awareness and educate farming communities about disaster risk-reduction principles. Furthermore, the department issues early warning information (National Airways Corporation monthly advisories) and daily extreme weather

warnings, including precautionary measures for different hazards which are loaded on the National Development Agency (NDA) and Agricultural Geo-referenced Information System (AGIS) (NDMC, 2006/2007:82). The National Department of Health has a Disaster Management Sub-Committee which focuses on pre-hospital, forensic pathology and in-hospital disaster preparedness sign-offs, policies and procedures as well as training with an emphasis on institutional capacity and institutional disaster management or preparedness planning (NDMC, 2006/2007:83). Furthermore, training workshops and capacity building programmes are conducted by government officials, non-governmental organisations (NGOs), and academic institutions which deal with disaster contingency planning and its linkages between disaster and development.

The National Disaster Management Centre (NDMC) is the highest administrative and executive authority for disaster management in South Africa. The objective of the NDMC is to promote an integrated and coordinated system of disaster management, with special emphasis on prevention and mitigation by national, provincial and municipal organs of state, statutory functionaries and other role-players involved in disaster management and communities (NDMC, 2006/2007:12). The Emergency Operations Committee (EOC) was established in 2004 to co-ordinate international response to disasters as and when required. Furthermore, the use of technology is used as an early warning system and its translation into understandable language to the communities at risk. Geographical Information Systems (GIS) plays a critical role in the development of the National Disaster Management Centre (NDMC), which also enhanced Disaster Management Information Systems (DMIS). The system can be seen as an all encompassing Information Technology (IT) solution that relates to various aspects of hazard analysis, vulnerability assessment, risk reduction, contingency planning, incident reporting systems as well as early warning systems (NDMC, 2006/2007:26-27).

Disaster management and public management: service delivery

The Constitution of South Africa of 1996 places a legal obligation on the government of South Africa to ensure the health of people, environmental protection and safety of its citizens. Section 24 of the Constitution (1996) refers to the protection of the environment which if not done can and will cause disasters.

Moreover, section 41 (1) (b) of the Constitution (1996) states that all spheres of government are required to “*secure the well being of the people of South Africa*”. It further provides, in section 152(e), that “*the objects of local government are to encourage the involvement of communities and*

community organisations in the matters of local government". Municipalities have an obligation to capacitate civil society through training and skills related to different hazards such as first aid, fire-fighting and communication.

The changes in South Africa's disaster management policy and legislation unfolded during a period of massive legislative reform in post-apartheid South Africa. Disaster management legislative reforms in South Africa took 11 years, from June 1994 to April 2005. There were a number of distinct phases in this development, namely, the Green Paper on Disaster Management (February 1998); White Paper on Disaster Management (January 1999); Disaster Management Bill (58-2001 in September 2001); Disaster Management Bill (B21-2002 in May 2002); Disaster Management Act (No. 57 of 2002 promulgated in January 2003) and the National Disaster Management Framework (April 2005).

The major accomplishment of the legislative reform process in South Africa was the transformation of the policy of disaster-risk management (NDMC, 2006/2007:25). Influenced by New Public Management (NPM), the South African government embarked on legislative transformation with the promulgation of the Disaster Management Act 57 of 2002. NPM has selected applications which include decentralising disaster management from national government down to local government. Decentralising management, disaggregating and downsizing of public services are strands of NPM derived from "managerialisms" (Mellon, 1993; Hood, 1991 and Ferlie *et al.* 1969:34). The public sector in general and public officials were also expected and encouraged to be results-oriented. Governmental managers have to increasingly evaluate and make necessary adjustments to all developmental projects so that they are able to involve risks, vulnerabilities and capacities (Dwivedi, 1994:4). Government managers will have to consider all other aspects of disaster management which included relief operations, rehabilitation, reconstruction, mitigation, development and preparedness planning, should their developmental projects be affected by any disaster. They further have to participate in joint consultation and co-operation with other departmental heads, NGOs and other stakeholders to ensure that every disaster management issue was addressed. The argument made by Thornhill (n.d.), in his discussion on the prerequisites for improved service delivery, is that officials in managerial positions should be able to operate within a sound administrative system, supported by equally sound managerial practices. Furthermore, managers should be capacitated to perform their managerial functions efficiently, for instance, they should be enabled to take decisions, to exercise discipline and to demand accountability from all their staff.

The Disaster Management Act of 2002 (Act 57 of 2002) provides disaster management officials with a new focus on disaster management. The Act presents new challenges in not only negotiating and writing up disaster management plans, but also in developing disaster management plans for general public scrutiny. Public scrutiny and acceptance of disaster management plans, prior to implementation, has become a legislative requirement (Municipal Systems Act 32 of 2000). In section 25 of the Municipal Systems Act 32 of 2000, it is indicated that each municipality should adopt a single, inclusive and strategic plan for the development of a municipality. The plan referred to is the Integrated Development Plan (IDP). Chapter 26(a) of the Municipal Systems Act stipulates that an IDP must reflect the municipal council's vision for long-term development of the municipality with special emphasis on the municipality's most critical development and internal transformational needs. The same Act, in section 26(g), dictates that 'applicable disaster management plans' are a core component of the IDP of a municipality. The problem with the Disaster Management Act of 2002 is that it does not provide detailed guidance for the preparation of disaster management plans, which can be included in an IDP. The lack of guidance, for the preparation of disaster management plans, leaves municipal disaster management departments in a quandary. Some of the information in a disaster management plan concerns operational procedures, which are not for general stakeholder consumption (Kent, 1992:5).

The challenge exists in deciding which of the disaster management components should be included in the IDP. The provision of section 26(g) of the Municipal Systems Act 32 of 2000 is clear: applicable disaster management plans are required in an IDP document as it is legislated as a core component of an integrated development plan.

Disaster preparedness by the eThekweni Municipality

The eThekweni Municipality is a Category A municipality enshrined in section 155 (1) of the 1996 Constitution of South Africa which has exclusive municipal executive and legislative authority in its area. Therefore, the eThekweni Municipality is the local government body responsible for governing and managing Durban (city).

Section 23 of the Local Government: Municipal Systems Act, 2000 (Act No 32 of 2000) prescribes that a municipality must undertake developmentally-oriented planning to ensure that it strives to achieve the objectives of local government set out in section 152 of the Constitution (2006). The eThekweni Municipality has an eight-point plan of sustaining the natural and built environment, economic development, job creation, quality living environments, safety, healthy and secure

environment, empowering citizens, celebrating our cultural diversity, good governance and financial viability and sustainability (eThekweni Municipality IDP, 2008/2009:40).

Disaster management is encapsulated under plan four (Safety, Healthy and Secure Environment) and its main goal is to promote and create a safe, healthy and secure environment. Moreover, disaster management and fire departments are under the Safety and Security cluster managed by the deputy city manager reporting to the city manager.

The eThekweni Municipality has developed 15 programmes to address the causes and effects of the threats to a safe environment for its citizens. Programme 3 (safe from fire and emergencies) has two strategies covering two broad areas: community fire safety education including fire prevention, and management and extending of emergency services (eThekweni Municipality IDP review, 2008/2009:42).

According to the eThekweni Municipality's IDP review (2008/2009:48), uncontrolled fires have a serious impact to the lives of all communities. Citizens, businesses and public infrastructure are all affected by incidents of fire. Loss of life and the destruction of property and possessions is difficult, if not impossible, to quantify. People living in densely populated informal settlements, without personal insurance, are particularly vulnerable to the effects of uncontrolled fires. Between 2008 and 2009, 12 natural disasters such as thunderstorms and 11 fires (man-made disasters), damaged informal settlements including Foreman and Kennedy Road (n.d.). Through effective fire and emergency services, the department aims to ensure that all communities have a level of confidence that the department recognises their duty of care, and are able to provide an acceptable level of safety (eThekweni Municipality IDP review, 2008/2009:49).

The main plan of the fire department is to prevent fires by promoting community education and awareness, promoting fire safety in buildings, developing appropriate regulations and ongoing research. The plan of the fire department includes community training and training and equipping of municipal staff to respond quickly and effectively. The department works collaboratively with other agencies whose work helps to prevent fires and improve response times, for example, rapid road access, road naming, house numbering, providing fire-fighting water hydrants, street lighting, and telecommunications (eThekweni Municipality's IDP review, 2008/2009:48).

In addition, Section 43 of the Municipal Systems Act, 2000 (Act 32 of 2000) prescribed key performance indicators which are included on the municipality's performance scorecards. Based on the legislation on Performance Management from the Department of Provincial and Local Government (Municipal Systems Act, 2000), the municipality's scorecard has been re-defined. The project matrix under the rubric of plan four (Safe, Healthy and Secure Environment) within the strategic focus area of "promoting the safety of citizens" programme (safe from fire and emergencies) reveals the following projects to be implemented between 2010 and beyond the financial year (eThekweni Municipality's IDP review, 2008/2009:48-49):

- Extend fire and rescue service to under serviced areas;
- Expanded Public Works Programme (EPWP) for community-based emergency response services;
- Community safety havens Develop a disaster risk-reduction plan for the jurisdictional areas of community safety havens; and
- Maintain acceptable levels of service delivery.

Programme 4 focuses on establishing disaster management within the municipality concerned. The municipality is concerned about the human suffering and economic loss that results from disasters. The department's response is guided by a three-phase approach which includes (eThekweni Municipality's IDP review, 2008/2009:49):

- Preventing disasters where possible;
- Responding to disasters when they do occur; and
- Assisting communities to recover from the effects of a disaster.

The eThekweni Municipality aims to prevent disasters by developing risk and vulnerability profiles. Once they have identified vulnerable areas, they will develop prevention plans and strategies. Furthermore, training communities to understand risks and how to respond to disasters serves as a preparedness and response function. Training municipal officials in effective disaster response is critical for ensuring that they are able to respond quickly and effectively to disasters (eThekweni Municipality's IDP review, 2008/2009:49).

Meanwhile, the project matrix for plan four (safe, healthy and secure environment) under the strategic focus of promoting the safety of citizens, programme (safe from disasters) have the following projects that are to be implemented in 2010 and beyond the financial year:

- Develop a disaster-risk reduction plan for the jurisdictional areas;

- EPWP: community-based emergency response services;
- Community safety-havens. SDB emergency and disaster management response centre planning; and
- Inanda, Ntuzuma and KwaMashu (INK) disaster-management and prevention programmes.

METHODOLOGY

The research methodology used in this study begins with the research design which dwells on the plan used to conduct the research.

Research approach

This study used the qualitative approach as a means of data analysis in order to study municipal officials who are working directly and indirectly on disaster management as well as on communities who are susceptible to fast-onset disasters in their natural setting. This study used semi-structured interviews directed at municipal officials with their participative observation experience to disaster or emergency occurrence. This study also used the quantitative method as questionnaires were distributed to the Foreman and Kennedy Road informal settlements.

Probability and non-probability sampling is discussed in this study as the researcher used both survey and case study strategies. Structured questionnaire were used in this study.

Research participants

The total sample population within the Foreman and Kennedy Road informal settlements was 220. The total number of questionnaires collected was 140 and there were no errors. Furthermore, semi-structured interviews were conducted with ten municipal disaster management officials. This study used ten questionnaires as a pilot and its main intention was to obtain some assessment of the questions validity and the likely reliability of the data that was considered. This study used nominal, ordinal and Likert or interval scale to distinguish the variables of the study. This study focussed on the stratified random sampling. The purposive sampling technique was used. This technique enabled the researcher to use judgement to select suitable cases to answer the research questions and to meet the researcher's objectives. A very satisfactory response rate of 63.6% was achieved.

Measuring instruments

Research procedure

In the case of this study, the researcher used semi-structured interviews with the eThekweni Municipality officials and questions varied because of the task and roles that they were performing were not the same (for example, the case of the councillor and disaster management manager). The questionnaire was self-administered in the Foreman and Kennedy Road informal settlements. The data was collected over a four-week period between June and July 2009.

Statistical analysis

The questionnaire was analysed statistically using the Statistical Packages for Social Sciences (SPSS). In this study, descriptive and inferential statistics were used as a measure for the chosen sample of respondents. The nature of the study required the researcher to use software such as Microsoft Excel and SPSS for data capturing, analysis and interpretation. Chi-square tests were also conducted in this study.

RESULTS

This study shows the research findings on disaster preparedness by using frequency tables, graphs and cross-tabulations. The columns labelled either 'Frequency' or 'Count' indicate the number of respondents that selected the particular option for the question. Figure 1 shows that 13.6% of respondents chose to stay in Foreman and Kennedy Road informal settlements because relatives lives in the area, 85% because of job opportunities, 5.7% because of better quality education, 7% due to provision of housing and water respectively and 2.9 % were impressed with the provision of health services.

Figure 1:

Reasons to come to Durban

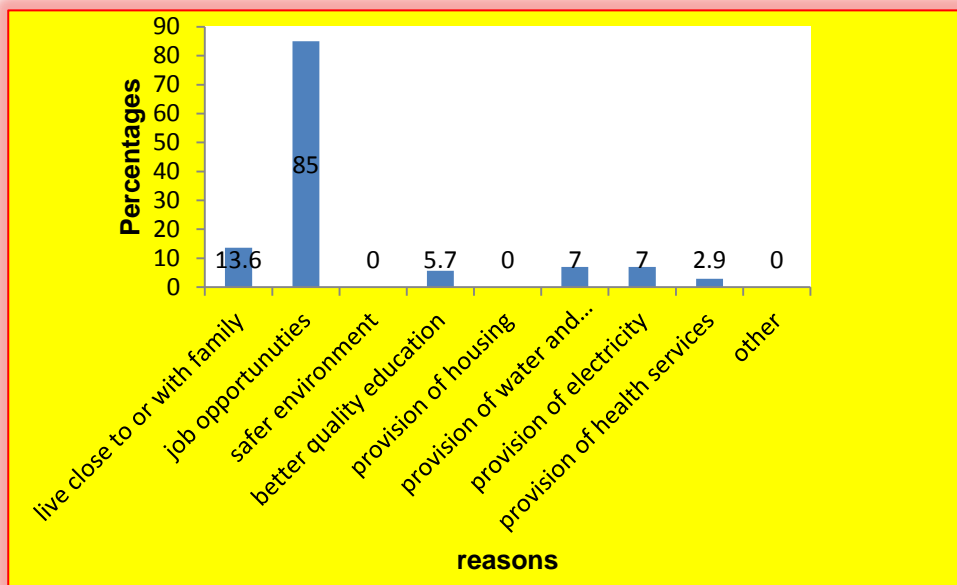


Figure 2:

Occupation Types

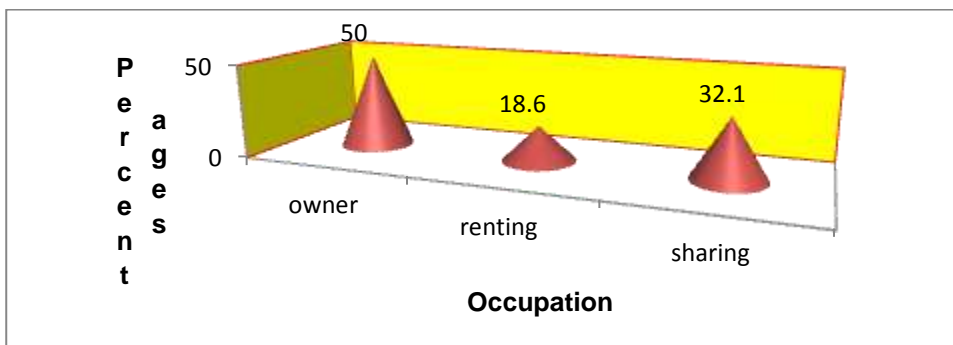


Figure 2 indicates that 50% of the respondents are owners, 18.6% are renting and 32.1% are sharing accommodation.

Figure 3:
Kinds of disaster experienced in the past five years

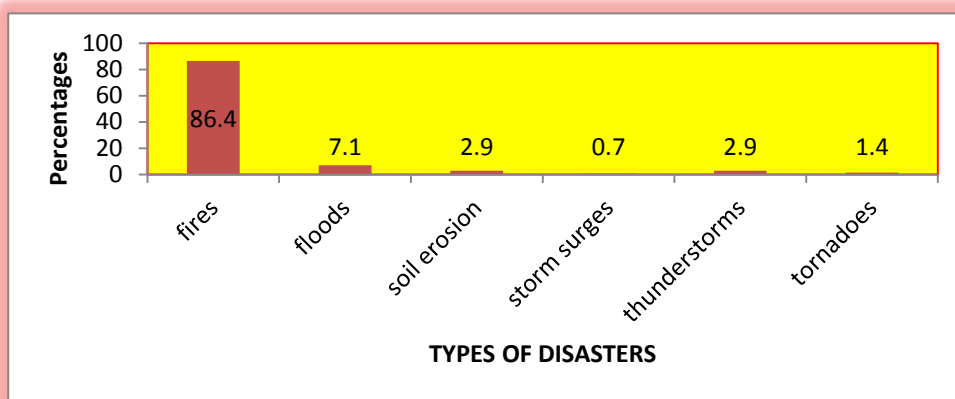


Figure 3 indicates that 86.4% of disasters are caused by fires, 7.1% floods, 2.9% soil erosion, 0.7% by storm surges, 2.9% by thunderstorm and 1.4% by tornadoes.

Table 1:
Relationship between kinds of disasters (emergencies) experienced in the past few years and the adequate protection from floods

Kinds of disasters		Adequate protection from fires												Chi-square	df	P
		Very safe		Safe		Neither safe nor unsafe		Unsafe		Very unsafe		Total				
		N	%	n	%	n	%	n	%	n	%	N	%			
Fires	Yes	4	2.9%	5	3.6%	2	1.4%	8	5.7%	102	72.9%	121	86.4%	3.452	4	0.485
	No	0	0.0%	0	0.0%	0	0.0%	0	0.0%	19	13.6%	19	13.6%			
Floods	Yes	0	0.0%	0	0.0%	0	0.0%	1	0.7%	9	6.4%	10	7.1%	1.208	4	0.877
	No	4	2.9%	5	3.6%	2	1.4%	7	5.0%	112	80.0%	130	92.9%			
Soil erosion	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	2.9%	4	2.9%	0.647	4	0.958
	No	4	2.9%	5	3.6%	2	1.4%	8	5.7%	117	83.6%	136	97.1%			
Storm surges	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	0.7%	1	0.7%	0.158	4	0.997
	No	4	2.9%	5	3.6%	2	1.4%	8	5.7%	120	85.7%	139	99.3%			
Thunderstorms	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4	2.9%	4	2.9%	0.647	4	0.958
	No	4	2.9%	5	3.6%	2	1.4%	8	5.7%	117	83.6%	136	97.1%			
Tornados	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	1.4%	2	1.4%	0.319	4	0.989
	No	4	2.9%	5	3.6%	2	1.4%	8	5.7%	119	85.0%	138	98.6%			

Table 1 indicates that 72.9% of the respondents were not protected from fires. The research findings show that 97.1% of respondents stated that, in the Foreman and Kennedy Road informal settlements, there are no preventative measures to alleviate fires. The research findings found that 86.4% of respondents were very unsafe from the outbreak of fires in these informal settlements.

Table 2:

Relationship between kinds of disasters and preventative measures in place

Kinds of disasters	Preventative measures in place						Chi-square	Df	P	
	Yes		No		Total					
	N	%	N	%	n	%				
Fires	Yes	4	2.9%	117	83.6%	121	86.4%	0.647	1	0.421
	No	0	0.0%	19	13.6%	19	13.6%			
Floods	Yes	0	0.0%	10	7.1%	10	7.1%	0.317	1	0.574
	No	4	2.9%	126	90.0%	130	92.9%			
Soil erosion	Yes	0	0.0%	4	2.9%	4	2.9%	0.121	1	0.728
	No	4	2.9%	132	94.3%	136	97.1%			
Storm surges	Yes	0	0.0%	1	0.7%	1	0.7%	0.030	1	0.863
	No	4	2.9%	135	96.4%	139	99.3%			
Thunderstorms	Yes	0	0.0%	4	2.9%	4	2.9%	0.121	1	0.728
	No	4	2.9%	132	94.3%	136	97.1%			
Tornados	Yes	0	0.0%	2	1.4%	2	1.4%	0.060	1	0.807
	No	4	2.9%	134	95.7%	138	98.6%			

Table 2 indicates that there is no significant relationship between kind of disasters and preparedness measures in place at the 95% level ($p > 0.05$). There appears to be no preparedness and preventive measures in place to stop or prevent fires or other disasters within Foreman and Kennedy Road informal settlements.

Figure 4:

Protection from floods

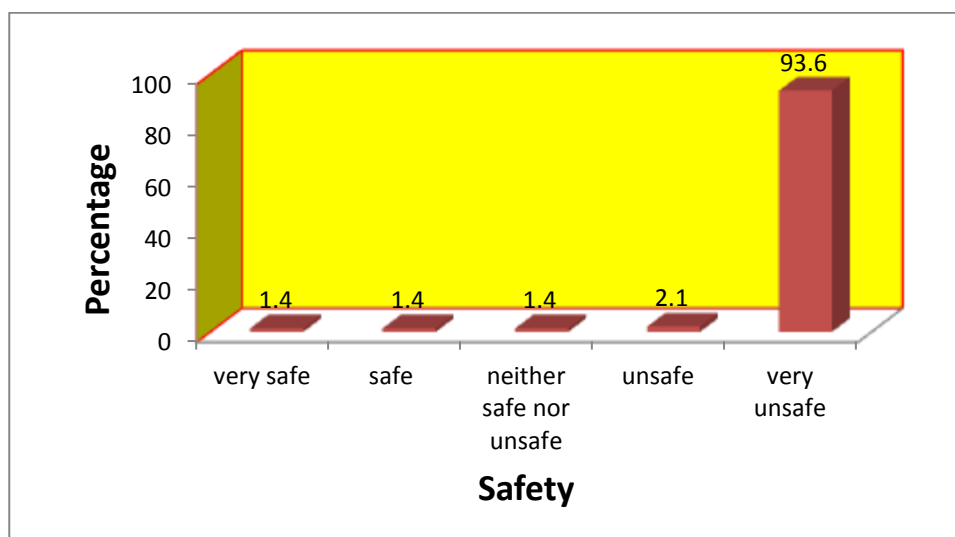


Figure 4 indicates that 93.6% of the respondents felt they were very unsafe from floods, 2.1% unsafe, 1.4% very safe and 1.4% felt safe.

Table 3: Relationship between protection from floods and types of materials used for building the shack

Type of building materials		Adequate protection from floods											Chi-square	Df	P	
		Very safe		Safe		Neither safe nor unsafe		Unsafe		Very unsafe		Total				
		N	%	n	%	n	%	N	%	n	%	N				%
Cardboard	Yes	1	0.7%	0	0.0%	0	0.0%	0	0.0%	52	37.1%	53	37.9%	4.578	4	0.333
	No	1	0.7%	2	1.4%	2	1.4%	3	2.1%	79	56.4%	87	62.1%			
Timber	Yes	1	0.7%	0	0.0%	0	0.0%	0	0.0%	80	57.1%	81	57.9%	10.215	4	0.037*
	No	1	0.7%	2	1.4%	2	1.4%	3	2.1%	51	36.4%	59	42.1%			
Zink	Yes	1	0.7%	1	0.7%	1	0.7%	1	0.7%	85	60.7%	89	63.6%	1.759	4	0.780
	No	1	0.7%	1	0.7%	1	0.7%	2	1.4%	46	32.9%	51	36.4%			
Wood	Yes	2	1.4%	1	0.7%	1	0.7%	3	2.1%	97	69.3%	104	74.3%	2.970	4	0.563
	No	0	0.0%	1	0.7%	1	0.7%	0	0.0%	34	24.3%	36	25.7%			
Concrete blocks	Yes	0	0.0%	0	0.0%	0	0.0%	0	0.0%	14	10.0%	14	10.0%	1.069	4	0.899
	No	2	1.4%	2	1.4%	2	1.4%	3	2.1%	117	83.6%	126	90.0%			

* p<0.05

The cross-tabulation in Table 3 indicates that there is a significant relationship between timber as a building material used and protection from floods at the 95% level (p<0.05). A total percentage of 57.1% of respondents feel very unsafe to build a house using timber.

Table 4: Relationship between types of materials used for building a shack/house and the protection from fires

		Adequate protection from fires											Chi-square	df	P	
		Very safe		Safe		Neither safe nor unsafe		Unsafe		Very unsafe		Total				
		N	%	N	%	N	%	n	%	N	%	n				%
Cardboard	Yes	3	2.1%	3	2.1%	0	0.0%	1	0.7%	46	32.9%	53	37.9%	6.794	4	0.147
	No	1	0.7%	2	1.4%	2	1.4%	7	5.0%	75	53.6%	87	62.1%			
Timber	Yes	3	2.1%	3	2.1%	0	0.0%	1	0.7%	74	52.9%	81	57.9%	10.528	4	0.032*
	No	1	0.7%	2	1.4%	2	1.4%	7	5.0%	47	33.6%	59	42.1%			
Zink	Yes	3	2.1%	4	2.9%	0	0.0%	3	2.1%	79	56.4%	89	63.6%	6.801	4	0.147
	No	1	0.7%	1	0.7%	2	1.4%	5	3.6%	42	30.0%	51	36.4%			
Wood	Yes	3	2.1%	2	1.4%	1	0.7%	3	2.1%	95	67.9%	104	74.3%	10.494	4	0.033*
	No	1	0.7%	3	2.1%	1	0.7%	5	3.6%	26	18.6%	36	25.7%			
Concrete blocks	Yes	0	0.0%	1	0.7%	0	0.0%	1	0.7%	12	8.6%	14	10.0%	1.279	4	0.865
	No	4	2.9%	4	2.9%	2	1.4%	7	5.0%	109	77.9%	126	90.0%			

* p<0.05

The cross-tabulation in Table 4 shows that there is no significant relationship between using concrete blocks and protection from fires because only 10% of respondents used blocks to build

their houses in both Foreman and Kennedy Road informal settlements. The association between the variables is not significant at the 95% level ($p > 0.05$). The cross-tabulation in Table 4 indicates that there is a significant relationship between timber (building material) and protection from fires at the 95% level ($p < 0.05$). The cross-tabulation further indicates that there is a correlation between wood as a building material used and very unsafe protection from fires at the 95% level ($p < 0.05$). The research finding indicates that 96.4% of the respondents never used South African Bureau of Standards (SABS) approved building materials in building their informal settlements.

Table 5:
The role of communities in disaster or emergency management before and after the disaster

	Frequency	Percent
Very important	78	55.7
Somewhat important	23	16.4
Not at all important	39	27.9
Total	140	100.0

Table 5 indicates that 55.7% of the Foreman and Kennedy Road informal settlements' respondents agree that they can play a very important role in disaster or emergency management before and after the disaster. A total of 16.4% stated that they could play a somewhat important role while 27.9% felt that they could not play an important role.

Case of Foreman and Kennedy Road Informal settlements

According to ward 25 councillor (personal communication, 2009), the main causes of fires in the shack settlements include the following:

- Alcohol;
- Deliberately caused by domestic violence or conflict between partners forgetting that they are endangering others;
- Wind that comes from the cracks or crevice and fans the flames of the candle; and
- Arson (whereby different tribal groups attack each other for instance in the case of Xhosa and Zulu people).

The ward 25 councillor for Foreman and Kennedy Road informal settlements confirmed that the municipality has installed equipment such as fire hosepipes on some areas to extinguish fires during a disaster. The councillor stressed that the equipment does not work because marshals are not

trained and there are delays in halting fires because of inefficiency and ineffectiveness from the municipal officials.

The ward councillor mentioned that the sprawling and congested nature of the informal settlements made it difficult and impractical to connect a water pipe to extinguish fires. The municipality embarked on a plan to provide residents with metal to build shelters in order to prevent fires in places such as Jadhu and Foreman Road and have constructed 150 such units. The councillor alluded that a link has been established with the committee members who telephones the fire department directly. Such a link ensures that there is a quick response from the fire department to extinguish fires in the informal settlements. The councillor stated that, during windy days, fires are uncontrollable and there are no measures in place to control them. Formal houses cannot be built in these shack settlements, as the municipality is bound by housing regulations which stipulate that a larger space is needed for one house. Moreover, some of the land occupied by the shacks (Foreman Road) is privately owned.

The ward councillor stated that, in protecting informal settlements from flooding, the council has relocated people who were living along the catchments of the river. There is little evidence that a disaster management framework, disaster management centre and a plan exist in the municipality to deal with emergencies such as fires. The municipality concerned has been prone to emergencies and disasters in the past 10 years. Unfortunately, the work of the municipality is hampered by the absence of a well established disaster management framework, policy and the plan, despite, section 42(1) of the Disaster Management Act 57 of 2002 which stipulates that each metropolitan and each district municipality must establish and implement a framework for disaster management in the municipality to ensure an integrated and uniform approach to disaster management in its area.

The present deputy city manager (B. Mkhize, personal communication, 2009) confirmed that the disaster management department, in its present form, is inappropriate as its sole function is to supply blankets and food parcels after an emergency or a disaster. According to the deputy city manager the following developments relating to disaster management are in progress:

- Relocation of the disaster management centre from the Central Business District (CBD) of Durban as it is located on the floodplain to high-lying area; and
- Designing an organogram of the department was still in progress and the appointment of different specialists such a Geographical Information Systems (GIS) specialist was being considered.

The disaster management manager (B. Keeves, personal communication, 2009) stated that the municipality concerned has a fragmented disaster management centre. The department failed to sustain the disaster management centre in the past years and it was dismantled. Key services of the centre, including training and media facilities, boardrooms, offices and training facilities are no longer existent.

According to the disaster management manager, the municipality is reestablishing the disaster management centre. He further, argued that an already drafted disaster management framework must be adopted. Moreover, a consultant should be appointed to undertake a risk assessment throughout the municipality concerned and formulate a disaster management policy document. This document can drive the formation of a disaster management plan.

The disaster management manager is of the view that service level agreements between the Disaster Management Department and other municipal units should be signed in order to ensure the supply of specialist skills during an emergency or a disaster. Whilst the manager indicated the compliance of the municipality to the Disaster Management Act, the high staff turn-over is a challenge and is aggravated by the fragmented organogram which does not respond to the needs of the department. The manager argued that the Disaster Management Department should be consulted in the planning and implementation of the various programmes and projects. The manager indicated that there was a top down approach by the deputy city manager (Safety and Security Cluster) who is designing an organisational strategy and new organogram without consulting the staff.

The manager: Storm Water Department (M. Ngcobo, 2009) stressed that the municipality is installing storm water pipes for upgraded informal settlements to low-cost housing developments to prevent flooding of the houses during disasters. The manager further argued that the municipality cannot install such pipes to certain areas as they are privately owned. Basic services to informal settlements are to be delivered, until budgets and plans are secured for final formalisation. Partnership with the Homeless People's Federation helps with data-gathering (enumeration) in the settlements and management of communal facilities. Partnership with Sao Paulo Municipality (Brazil), assists in informal settlement upgrading based on the Brazilian experience of upgrading informal settlements (Dwivedi, 1994:9).

DISCUSSION

Based on the results of this study, several conclusions can be drawn. The study shows a major difference between job opportunities and other reasons which led the respondents to migrate to Durban. There is an urgent need for the decentralisation of industries and basic services to rural areas. The overcrowding of people in the informal settlements makes it difficult for the municipalities, with budgeted resources, to prepare and prevent disasters. Fires in the informal settlements are perpetuated by the fact that there are no preventative measures in place. Consequently, there are no fire extinguishers and water hydrants and preparedness strategies in the form of awareness and education. Elo, Palm & Vrolijk (1995:11) argue that strategies for disaster reduction in urban areas include having a community that is alert and prepared to cope with disasters through their realistic assessment of the risks and the knowledge, ability and resources to take adequate protective measures. The planning policies and practices within the eThekweni Municipality fail to help informal settlements that are susceptible to fires through early warning systems. Napier (2000:16) indicates that, as a result of improvements in early warning systems and disaster preparedness, the number of people killed by natural disasters each year has decreased over course of the last century.

The researchers found that the population densities might be the cause of uncertainties because the informal settlements are close to each other. A possible contributing factor that causes people to feel unsafe from the impact of fires is the absence of a 24 hour community warning devices and procedures. People use building materials which perpetuate fires because they are not allowed to formalise their informal settlements. For example, if a respondent replaces plastic or zinc shack with brick, the Land Invasions Unit destroys the shack. Informal settlements are constructed typically from materials such as timber, corrugated iron, plastic sheeting and other temporal materials that exacerbate fires which are mainly caused by the use of paraffin and candles.

On the basis of these findings, it is suggested that the eThekweni Municipality should comply with the Disaster Management Act 57 of 2002 which requires the establishment of a disaster management centre, disaster management framework, disaster management policy and a disaster management plan to be attached to the IDP. Furthermore, the council should implement best practice which includes indigenous knowledge application, disaster management plans and development initiatives. Moreover, examples of best practice must encapsulate early warning messages through community radio stations, television and pamphlets.

The Fire and Emergency Services should design a course in Fire Fighting and Prevention specifically to be implemented in the informal settlements. The trainees can thereafter be expected to take back the skills and knowledge gained and educate residents in the informal settlements. The trainees can also assist the fire brigade, as they would have a good understanding of the procedures and protocols for fire fighting.

CONCLUSION

It is obvious from this research that the informal settler's decision to occupy disaster-prone settlements is influenced by a lack of alternative opportunities, scarce resources, the need to gain access to employment, and short-term horizons. However, the majority proceed to stay in very unsafe conditions without the municipality's disaster preparedness strategies. There is poor attention paid to shack dwellers given to the benefits of keeping them in the same location after a disaster, by providing the appropriate infrastructure to reduce vulnerability in future. The planning policies and practices fail to solve informal settlements that are susceptible to fires without any warning systems in place. Appropriate formal houses with sturdy building materials should be built with the aim of eliminating the mushrooming of informal settlements to open spaces. Therefore, future research could profitably overcome the aforementioned challenges by looking at other factors such as public involvement in preparedness planning, Geographical Information Systems (GIS) applications, legal liability and intergovernmental tensions to disaster management. GIS should be used mainly for hazard identification and mapping and houses built should comply with urban planning by-laws. The municipalities should promote integrated and coordinated disaster management through partnerships between different stakeholders and through cooperative relations between all spheres of government.

REFERENCES

- Alexander, D. 2002b. "From civil defence to civil protection – and back again", *Disaster Prevention and Management*, 1(3): 209-13.
- Allen, K. 2006. Building Community Resilience to Disaster in the Philippines', in International Federation of Red Cross and Red Crescent Societies (ed). *World Disaster Report: Focus on Community Resilience*, Geneva: International Federation of Red Cross and Red Crescent Societies.
- Armstrong, E. 2005. *Integrity, Transparency and Accountability in Public Administration: Recent Trends, Regional and International Developments and Emerging Issues*, United Nations.
- Blanco, A. V. R. 2006. Local initiatives and adaptation to climate change. *Disasters*, 30(1): 140-

- Bullock, J. A. and Perry, G.D. 2000. *Introduction to Emergency Management*. Amsterdam: Butterworth-Heinemann.
- Cannon, T. 1994. *Vulnerability analysis and the explanation of 'natural' disasters: In Disasters, Development and Environment*. Chichester: Wiley & Sons.
- CMCHD, MRC, HST. 1996. *The State of Housing, Water and Sanitation in the Greater Metropolitan Area of Cape Town, Cape Town, 1995*: Cape Town Metropolitan Council Health Department, Medical Research Council of South Africa, Health Systems Trust.
- Coburn, A., Pomonis A., Sakai, S. & Spence, R. 1991. *Assessing human casualties caused by building collapse in earthquakes*. In: *Summaries of the International Conference on the Impact of Natural Disasters*, University of California: Los Angeles.
- Col, J.M. 2007. Managing Disasters: The Role of Local Government. *Public Administration Review*, 1(3): 112-125.
- Commission for Africa. 2005. *Our Common Interest: Report of the Commission for Africa*. The Commission. Available online: <http://nepad.org>. Accessed 03-07-2010.
- Cronin, M.S. 2008. Social Work in the International Context of Poverty and Social Inequality. *18 World Conference of Social Work*, 6(2): 1-14.
- Donohue, S., Masilela, T. & Gear, J. 2000. *Disaster Management*. South African Health Review. hst.org.za. Accessed 16-07-2010.
- Dwivedi, K.N. 1994. *Mental Cultivation (Meditation) in Buddhism*. *Psychiatric Bulletin*, 18: 503-504.
- Elo, O., Palm, E. & Vrolijk, L. 1995. *Disaster Reduction in Urban Areas*. Secretariat of the International Decade for Natural Disaster Reduction (IDNDR). United Nations Department of Humanitarian Affairs. Geneva.
- Ferlie, E., Ashburner, L.L, Fitzgerald, S. & Pettigrew, A. 1969. *The New Public Management in Action*. Oxford University Press, Oxford.
- Ferreira, S.L., de Meyer, M., Loots, H. & Keyise, N. 2002. "Spot 5 Quantifies rapid urban change", GTI. www.iscram.org. Accessed 28-08-2010.
- Haddow, D.G. & Bullock, J.A. 2006. *Emergency Management*. 2nd edition. New York: Elsevier Butterworth.
- Haddow, G. D. & Bullock, J.A. 2007. *Introduction to emergency management*. New York, NY: Butterworth-Heinemann.
- Hewitt, K. 1983. *The idea of calamity in a technocratic age*. In K. Hewitt (Ed.), *Interpretations of calamity*. Boston: Allen and Unwin.

- Holloway, A. 2003. *Disaster Risk Reduction in Southern Africa: Hot rhetoric-cold reality*, 12(1): 29-38.
- Hood, C. C. A. 1991. *Public Management for All Seasons?*, *Public Administration*. 3-19.
- Huchzermeyer, M. 2001. Housing for the poor? negotiated housing policy in South Africa. *Habitat International*, 25 (3): 303-331.
- Huchzermeyer, M. 2003. Housing rights in South Africa: invasions, evictions, the media and the courts in the cases of Grootboom, Alexandra and Bredell. *Urban Forum*, 14(1): 80-107.
- International Federation of Red Cross and Red Crescent Societies (IFRC). 2000. www.ifrc.org. Accessed 18-05-2010.
- Kent, R. 1992. *Disaster Preparedness*. 1st Edition. UNDRO, UNDMTP. New York: Greenwood Press.
- Khady, D. 2007. Governance and natural disasters: addressing flooding in Saint Louis. *Environment and Urbanization*, 19: 552-562.
- Kundzewicz, Z.W., Budhakooncharoen, S., Bronstert, A., Hoff, H., Lettenmaier, D., Menzel, L. & Schulze, R. 2002. Coping with variability and change: Floods and droughts, *Natural Resources Forum*, 26(4):263-27
- Local Government. Municipal Systems Act, 2000 (32 of 2000), Pretoria: Government Printer.
- Manitoba Health Department. 2002. Disaster Management Model for the Health Sector: Guideline for Programme Development. www.gov.mb.ca/health/odm/model. Accessed 14-06-2010.
- Manitoba Health Disaster Management. 2002. *Disaster Management Model for the Health Sector: Guidelines for Programme Development*, Canada.
- Mason, C. & Baltsavias, E.P. 1997. 'Airborne laser scanning: basic relations and formulas', *ISPRS Journal of Photogrammetry and Remote Sensing*, 54: 199-214.
- Mellon, C.A. 1993. *Naturalistic inquiry for library science: methods and applications for research, evaluation and teaching*. New York: Greenwood Press.
- Napier, M. & Rubin, M. 2002. 'Managing environmental and disaster risks affecting informal settlements: Lessons in innovative practice from South African local authorities' submitted to the conference *Sustainable livelihoods in the integration of informal settlements in Asia, Latin America and Africa*, 10-13 October 2002, Surabaya, Indonesia.
- Napier, M. 2000. *Informal settlement integration, the environment and sustainable livelihoods in Sub-Saharan Africa*. Council for Scientific and Industrial Research (CSIR), South Africa.
- O'Keefe, P., Westgate, K. & Wisner, B. 1976. *Taking the naturalness out natural disasters*, *Nature* 260 (5552): 566-567.
- Republic of South Africa. 1996. *The Constitution of the Republic of South Africa*.

- Republic of South Africa. 1997. *White Paper on Transforming Public Service Delivery* (Batho Pele). Pretoria: Ministry of Provincial and Local Government.
- Republic of South Africa. 2002. Disaster Management Act 57 of 2002. Government Gazette number 24252: 15 January.
- Republic of South Africa. 2005. A Policy Framework for Disaster Risk Management in South Africa. GN 654.
- Republic of South Africa. Civil Protection Act, 1977 (Act No. 67 of 1977).
- Republic of South Africa. Fund-Raising Act, 1991 (Act No. 8 of 1991).
- Republic of South Africa. Local government: eThekweni Municipality. 2005-2006. *Annual Report. Durban.*
- Republic of South Africa. Local government: eThekweni Municipality. 2005-2006. *Integrated Development Plan. Durban.*
- Republic of South Africa. Local government: eThekweni Municipality. 2008-2009. *Integrated Development Plan. Durban.*
- Republic of South Africa. Local government: eThekweni Municipality. 2010 and beyond. *Integrated Development Plan. Durban.*
- Republic of South Africa. Public Finance Act, 1999 (Act No. 1 of 1999).
- Republic of South African Weather Service Act, 2001 (Act No. 8 of 2001).
- Republic of South Africa. White Paper on Disaster Management. 1999.
- Statistics South Africa. 1997. The people of South Africa, Population Census, 1996: Census in brief. Pretoria: Statistics South Africa.
- Sutton, J. & Tierney, K. 2006. *Disaster Preparedness: Concepts, Guidance, and Research*. Natural Hazards Centre. Institute of Behavioural Science. University of Colorado.
- Thornhill (n.d.). *Prerequisites for Effective Service Delivery*. School of Public Management and Administration. University of Pretoria.
- UNCHS (Habitat). 1997. *Global urban observatory: monitoring human settlements with urban indicators*. Nairobi: UNCHS (Habitat).
- United Nations Development Programme. 2004. "Reducing Disaster Risk: A Challenge for Development". New York: UNDP.
- Van Zyl, T.L., Parbhoo, C., Moodly, D., Cwela, B., Umkhonza, D., Shabangu, P., Vahed, A. & ICT 4EO. 2009. *The Meraka Institute, Johannesburg, South Africa. School of Computer Science*, University of KwaZulu-Natal Durban, South Africa.
- Wisner, B., Blaikie, P., Cannon, T. & Davis, I. 2004. *At Risk: Natural Hazards, people's Vulnerability and Disasters*, second ed. Routledge, London, UK & New York, NY.

- Wu, J.Y. & Lindell, M.K. 2003. *A comparative study of housing reconstruction after two major earthquakes: The 1994 Northridge earthquake in the United States and the 1999 Chi-Chi earthquake in Taiwan*. Doctorate thesis, Texas A&M University.
- Yohe, G.W., Lasco, R.D., Arnell, N.W., Cohen, S.J., Hope, C., Janetos, A.C. & Perez, R.T. 2007. *Perspectives on climate change and sustainability. Climate Change: Impact, Adaption and Vulnerability*. Cambridge: Cambridge University.
- Zodhiates, S., Bakera, W. & Kemp, T.R. 1996. *Hebrew Key Word Study Bible: International version*. Chattanooga: AMG Publishers.

Contact details

Author	: Bethuel S. Ngcamu
Mangosuthu University of Technology	: Organisational Development Coordinator
e-mail address	: ngcamub@mut.ac.za
Address	: 37 Dagwood Crescent Kingsburgh 4126
Telephone number	: 031-9164385
Cell phone number	: 0795589794
Fax number	: 0865663095
Senior lecturer	: Dr. N. Dorasamy
Department	: Public Management and Economics
Durban University of Technology	: Senior Lecturer
e-mail address	: nirmala@dut.ac.za
Address	: 41/43 ML Sultan 4000
Telephone number	: 031-3736862
Cell Number	: 0722678704
Fax Number	: 0865509932

