DISASTER MITIGATION BY LOCAL GOVERNMENT: A CASE STUDY OF FOREMAN AND KENNEDY ROAD INFORMAL SETTLEMENTS IN THE ETHEKWINI MUNICIPALITY, KWAZULU-NATAL, SOUTH AFRICA

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Abstract

Disaster mitigation is one of the phases within the disaster management cycle which alleviates the adverse impact of disasters by instituting structural and non-structural measures where infrastructure and people are at risk. Disaster mitigation remains an overlooked phenomena by governments in developing countries, despite its negative repurcusion which is aggravated by economic downturns, infrastructural destruction and political unrest. The literature review reveals a need for long-term disaster mitigation strategies to be carried out well before disaster events. Among the most crucial demands are the need to embed mitigation in government departments's planning programmes, the need for community participation and intergovernmental relations with the aim to create disaster resistent communities.

The purpose of the article is to contribute to the development of a robust disaster management framework and the centre within eThekwini Municipality with the aim to create properly balanced mitigation strategies. Furthermore, 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 mitigation.

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. Data was analysed in the form of frequency distribution and cross-tabulation tables. The article indicates a significant difference between sturdy and non-compliance building materials used to build the informal settlements. The article indicates that eThekwini Municipality does not have mitigation strategy as well as short or long-term planning. The building density, the use of combustible building materials for wall and roofs, and structural instability, all have a considerable influence on the spread of fire to the informal settlements.

Key words: hazards mitigation, informal settlements, New Public Management (NPM)

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INTRODUCTION

An increase in human settlements in vulnerable areas is caused by rapid uncontrolled urbanisation, illegal immigration and precarious economic conditions which are also the three main reasons for the exarcebated effects of natural disasters in developing countries. However, it is also generally agreed that disasters are becoming more severe and more frequent in the case of developing countries (Alexander, 1993:495; Smith, 1992:30; Tolba, 1992:86; International Decade for Natural Disaster Reduction (IDNDR), 1996:10 & Natural Hazards Observer, 2000:3). Under such circumstances, mitigation is generally a low priority for governments and individuals. Since the benefits of mitigation activities in the informal settlements are not immediately tangible, the costs and sacrifices that are often

required to reduce personal and community vulnerability are difficult to justify in the absence of an imminent threat. Drabek (1991:8) avers that citizen demand for mitigation is often artificially low, as people have a natural psychological inclination to underestimate risk and tend to minimise the danger they perceive from hazards in their environments.

Government is accountable to citizens for quality service delivery such as housing provision. The Constitution of the Republic of South Africa, 1996, 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 community participation in matters of local government (Armstrong, 2005:2). Democratic government spheres are accountable to all its citizens, who are vulnerable and susceptible to fast onset disasters by providing relevant responses such as physical and social mitigation. Government accountability to all citizens translates to improving the lives of the poor and the vulnerable. The three tiers of government are expected to reduce the fragility of existing vulnerable settlements by legitimizing and improving existing informal settlements.

There is a high rate of industrialization in many parts of Greater Durban because of its geographical location along the Indian Ocean, which is accessible to developed countries such as Japan for transportation in relation to exportation and importation. These have impacted on the Foreman and Kennedy Road informal settlements as people moved to these areas for better job opportunities. These settlements are prone to emergencies and disasters such as floods and fires which negatively impact on people living in these vulnerable areas. Furthermore, global warming has contributed to droughts, storm surges and unpredictable weather events.

The implementation of disaster management is essential to all countries as it can avoid and mitigate the impact of disasters. 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.

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. Moreover, people who are the victims of disasters are not warned early as the study that was conducted on the Tsunami in Tamil Nadu (India) found that only 15% of the population had been warned of the impending tsunami and that most of these warnings came from family and friends (Centre for Research on the Epidemiology of Disasters (CRED), 2006:2).

International declarations and proposals by the United Nations Development Programme and other organisations dealing with disaster risk reduction play a tremondous role in disaster mitigation. 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 mitigation, assist countries struck by catastrophies with mitigation strategies. Modern international strategies and models for disaster risk reduction to be used by eThekwini Municipality are encupsulated within the Disaster Management Act of 2002 (Act 57 of 2002) to mitigate the impact of disasters. Section 52(1) (a) of the Disaster Management Act mandates all municipalities to have a disaster management plan inclusive of mitigation strategies in the event of disasters.

This article seeks to investigate disaster mitigation within eThekwini Municipality.Literature shows the fragmented management of disaster actions such as mitigation which have 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 mitigation as informal settlement grows in metropolitan areas of South Africa. Such settlements have 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 mitigation strategies are adequately implemented in informal settlements with the aim to mitigate the impacts of disasters.

Previously, mitigation strategies were ignored because disaster management was responding to and recovering from the impacts of disasters as disasters were governed by Civil Protection Act of 1997 (Act 67 of 1977) and the Fundraising Act of 1978 (Act 107 of 1978). Disaster management in the past delt with response and recovery, whereas, disaster risk management encapsulates all disaster management components (prevention, preparedness, mitigation, response, recovery and rehabilitation). Thus, with the enactment of the Disaster Management Act of 2002 (Act 57 of 2002), section 20(1) mandates the National Disaster Management Centre (DMC) to give guidance to organs of state, the private sector, NGOs, communities and individuals to assess and prevent or reduce the risk of disasters.

Herzog (2007:600) suggests that disaster effects can be lessened with insightful mitigation or planning efforts. Yodmani (2001:23) suggests that disaster management practices have evolved from largely a top-down relief and response approach to a more inter-sectoral risk management approach. The article recommends that these suggestions require consideration as disaster mitigation by the municipality is inadequate.

Global approach to disaster management

Disaster risk management is mostly considered a developmental approach to disaster management (Van Niekerk, 2005:10). Disaster risk management differs from disaster management as it deals the with systematic management of administrative decisions and the implementation of policies and strategies while disaster management deals with the management of resources including disaster prevention, mitigation, preparedness, response and rehabilitation or recovery (Van Niekerk, 2005:10).

Disaster management strategies can be 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.

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 mitigation as a way to reduce the impact of disasters. One of the four goals of the International Decade for Natural Disaster Reduction (IDNDR) deals with improving the capacity of each country to mitigate the effects of natural disasters, paying special attention to assisting developing countries in the assessment of disaster damage potential and in the establishment of early warning systems and disaster-resistant structures when and where needed (Housner, 1989:45-46; Lechat, 1990:2 and Smith, 2002:348). Furthermore, the United Nations adopted its International Strategy for Disaster Reduction (ISDR) in 2001 to promote the necessity for disaster reduction and risk mitigation as part of its central mission (Cronin, 2008:10). The United Nations (UN) promotes preparedness, prevention and mitigation activities through its regular development projects.

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 States 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. In developed countries, there are also good public-private partnerships which help the disaster preparedness and mitigation programmes.

Disaster mitigation and informal settlements in South Africa

Disaster mitigation can be defined as preimpact actions that passively protect against casualties and damage at the time of the hazard impact as opposed to an active emergency response and includes community protection works, land use practices, and building construction practices works (Lindell and Perry, 2000:3).

Disaster mitigation includes measures that can be taken to minimize the destructive and disruptive effects of hazards and thus lessen the magnitude of a possible disaster. It is argued that disaster mitigation can occur at any time, but is most beneficial if it is taken before an event escalates into a severe disaster. Haddow *et al.* (2006:158) indicate that mitigation is the cornerstone of disaster management as it includes keeping homes away from floodplains, engineering bridges to withstand earthquakes, creating and enforcing effective building codes to protect properties from hurricanes, earthquake, floods, and landslides. According to FEMA (1999), disaster mitigation is defined as *"sustained action taken to reduce or eliminate the long-term risk to people and property from hazards and their effects"*. Disaster mitigation can be structural for example mitigating hazards to prevent a disaster, as well as non-structural for example mitigating the vulnerability of a community to reduce the impact of a disaster.

One way to reduce disaster damage in the aforementioned areas is to adopt hazard mitigation practices, which can be defined as actions that protect passively at the time of impact (Haddow and Bullock, 2006:168). Hazard mitigation does not require people to take action when the disaster strikes. Hazard mitigation involves (Haddow and Bullock, 2006:167):

  i. hazard source control intervening at the point of hazard generation to reduce the probability or magnitude of an event.
 ii. community protection works, such as dams and levees, confining or diverting materials flows.
iii. land-use practices such as reducing or eliminating development on land that has high hazard exposure.

iv. building construction practices using strong materials and hazard-resistant design, such as window shutters that protect against wind pressure and debris impact.

v. building contents preventing damage to furniture and equipment such as furnaces, air conditioners, washers, and dryers.

Mitigation differs from the emergency management disciplines because it looks at long-term solutions for reducing risk as opposed to preparedness for hazards, the immediate response to a hazard, or the short-term recovery from a hazard event. Long-term solutions for disaster mitigation strategies are necessary in areas mushroomed by informal settlements as well as in the hazardous open areas .

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 the urban poor (Huchzermer, 2001; Mason & Baltsavias, 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 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, de Meyer, Loots & Keyise, 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). According to the National Disaster Management Centre (2006/2007:12-13), natural disasters such as devastating floods, violent hailstorms, heavy snowfalls and gale-force winds are regular occurrences in South Africa. 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.

THE NATURE OF FOREMAN AND KENNEDY ROAD INFORMAL SETTLEMENTS

Foreman and Kennedy Road informal settlements are mired in squalor on the periphery of society. An estimated 14 000 people who live in these settlements have long attracted predators such as politicians, shacklords, academics, journalists, Non-Governmental Organizations (NGOs), tavern owners to make a quick buck from human misery. As Ballard (2003:5) notes, this distinguishes South Africa where, unlike the United States and Great Britain in the late 1950s and early 1960s in which the poor were 'rediscovered' by social scientists, the poor have *"re-entered the national scene because they have made themselves visible again by their capacity to fight and resist."*

Foreman and Kennedy Road informal settlements are characterized as a transitional space, where people come only temporarily, in the hope of getting a job and then a formal house to which they bring their family from rural areas. Many of these families come to look for better schools for their children in the Indian neighborhood that have opened up to black children at the end of school segregation. Furthermore, some families migrate to these areas with the hope to acquire the basic needs such as shelter, clean drinking water, electricity, proper sanitation and access to primary health care. Some suggest that this precipitated the demographic shift in the settlement from mostly migrant laborers to entire families (Bryant and Pithouse, 2005:10).

These settlements are represented by an organisation called Abahlali baseMjondolo (People living in shacks). It is this organization that the people living in this area rely on. The organization acts as the councillors of this area. At Foreman and Kennedy Road, the movement began with a convergence of people's frustration over a series of events which they saw as broken promises from the eThekwini Municipality. Abahlali BaseMjondolo marched frequently as a movement and representing Ward 25 grievances, ranging from ownership of houses, employment, HIV/AIDS treatment, access to municipal basic services, disasters such as fires to breeding of diseases.

The KwaZulu-Natal Elimination and Prevention of Re-emergence of Slums Bill, 2006 was imposed on the people living in the informal settlements throughout the province. Abahlali baseMjondolo resisted the Bill based on the fundamental flaws in the positioning of the Bill as there is no consensus in South Africa or internationally on the desirability *'to introduce measures which seek to enable control and*

elimination of slums, and the prevention of their re-emergence'. The need for the Bill was to focus on fulfilling constitutional state obligations, rather than trying to achieve the elimination of slums. On 14 October 2009, the South African Constitutional Court found the law to be in conflict with the Constitution of South Africa (Act 108 of 1996) and struck it down. Costs were awarded to Abahlali baseMjondolo. According to the judgment, the legislation would have allowed for the possibility of mass evictions without the possibility of suitable alternative accommodation and would have therefore violated the Prevention of Illegal Evictions Act (PIE Act 19 of 1998) and South Africa's Constitution. These developments account for the continued existence of the informal settlements.

Disaster management and public management: service delivery

The Constitution of South Africa (Act 108 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) states that everyone has the right to an environment that is not harmful and is protected for the benefit of present and future generations, through reasonable legislative and other measures.

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, relating to different hazards such as first aid, fire-fighting and communication.

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 of 2002 (Act 57 of 2002). NPM has selected application 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" (Ferlie *et al.,* 1969:34; Hood, 1991 and Mellon, 1993). The public sector in general and public officials are 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 include 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 is addressed.

The Disaster Management Act of 2002 (Act 57 of 2002), provides disaster management officials with a new focus on disaster management. It presents new challenges in not only negotiating and preparing 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 Sytems Act of 2000 (Act 32 of 2000). In section 25 of the Act, it is indicated that each municipality should adopt a single, inclusive and strategic plan (Integrated Development Plan) for the development of a municipality. Chapter 26(a) of the Act stipulates that an Integrated Development Plan (IDP) must reflect the municipality'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 must be included in an IDP. Some of the information in a disaster management plan concerns operational procedures, which are not for general stakeholder consumption (Kent, 1992:5).

While 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 of 2000 (Act of 32 of 2000) states that applicable disaster management plans are required in an IDP document as it is legislated as a core component of an IDP. The lack of guidance, for the preparation of disaster management plans, leaves municipal disaster management departments in a quandary.

Disaster mitigation by the eThekwini Municipality

The eThekwini 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 eThekwini Municipality is the local government body responsible for governing and managing the city of Durban.

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 eThekwini 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 (eThekwini 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 eThekwini 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 (eThekwini Municipality IDP review, 2008/2009:42).

Citizens, businesses and public infrastructure are all affected by natural and man-made disasters. The impact of loss of life and the destruction of property and possessions is difficult, if not impossible, to quantify. Between 2008 and 2009, 12 natural disasters such as thunderstorms and 11 fires (man-made disasters) damaged informal settlements throughout eThekwini Municipality including Foreman and Kennedy Road (n.d.). According to the eThekwini Municipality's IDP review (2008/2009:48), uncontrolled fires have a serious impact on the lives of all communities. People living in densely populated informal settlements, without personal insurance, are particularly vulnerable to the effects of such disasters.

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 (eThekwini 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 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 strategies such as rapid road access, road naming, house numbering, providing fire-fighting water hydrants, street lighting, and telecommunications (eThekwini Municipality's IDP review, 2008/2009:48).

In addition, Section 43 of the Municipal Systems Act, 2000 (Act 32 of 2000) prescribes key performance indicators which are included in 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 (eThekwini 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 with human suffering and economic loss that results from disasters. The department's response is guided by a three-phase approach which includes (eThekwini 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 eThekwini 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 (eThekwini Municipality's IDP review, 2008/2009:50).

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:

- 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.

The capacity of eThekwini Municipality to plan and regulate urban development, enable access to safe housing and well-sited land and provide hazard mitigating infrastructure is a condition for risk reduction.

METHODOLOGY

Research approach

This article used the quantitative method as questionnaires were distributed to the Foreman and Kennedy Road informal settlements. This article also used the qualitative approach as a means of data analysis to ascertain the municipal officials roles and responsibilities who are working directly and indirectly on disaster management. This article used semi-structured interviews directed to municipal officials with their participative observation experience with regard to disaster mitigation strategies used within eThekwini Municipality.

Research participants

The total sample population within the Foreman and Kennedy Road informal settlements was 220. This article 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. A very satisfactory response rate of 63.6% was achieved.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.

Measuring instruments

Research procedure

In the case of this article, the researcher used semi-structured interviews directed to eThekwini Municipality officials and questions varied because of the task and roles that the officials perform were not the same (for example, the case of the councillor and Fire Department 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 article, 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 used.

RESULTS

This article shows the research findings on disaster mitigation 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 indicates that 37.9% of respondents used cardboard in building their shacks, 57.9% used timber, 63.6% used zinc, 74.3% used wood and 10% used concrete blocks.

The cross-tabulation in Table 1 indicates that there is a significant relationship between using timber as a building material 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. A disproportionately high percentage (69.3%) of respondents felt very unsafe using wood as a building material. Furthermore, a disproportionately low percentage (10%) felt very unsafe using blocks as building materials.

Figure 1. Types of materials used to build shacks
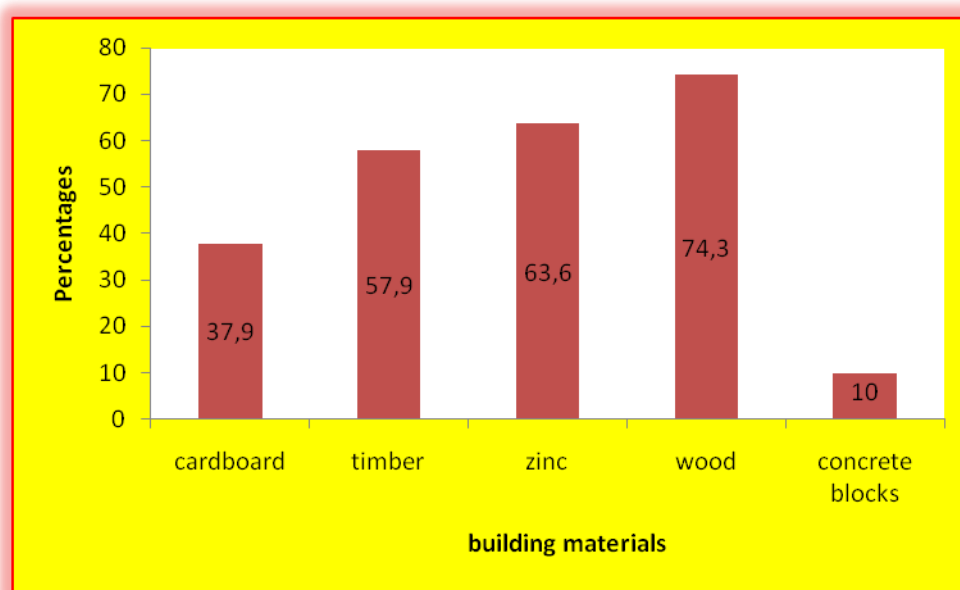
Source: own

Table 1. Relationship between protection from floods and types of materials used for building the shack

Type of building materials		How adequately protected are you 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%			

* $p < 0.05$
Source: own

The cross-tabulation in Table 2 shows that there is a significant association between building dam walls and acceptable standards at 1% level of significance. There is a significant association between installing a drainage system and acceptable standards respectively at the 95% level ($p < 0.05$).

Table 2. Relationship between responses to reduce risks after a disaster and the resources of acceptable standard used to build a house or shack

| Responses to reduce risk after a disaster | | Resources of acceptable standard used to build a shack | | | | | | Chi-square | Df | P |
		Yes		No		Total				
		n	%	N	%	N	%			
Building resistant houses	Yes	1	0.7%	6	4.3%	7	5.0%	2.456	1	0.117
	No	4	2.9%	129	92.1%	133	95.0%			
Building embankments	Yes	0	0.0%	3	2.1%	3	2.1%	0.114	1	0.736
	No	5	3.6%	132	94.3%	137	97.9%			
Building dam walls	Yes	1	0.7%	1	0.7%	2	1.4%	12.700	1	**0.000***
	No	4	2.9%	134	95.7%	138	98.6%			
Installing drainage system	Yes	2	1.4%	9	6.4%	11	7.9%	7.400	1	**0.007***
	No	3	2.1%	126	90.0%	129	92.1%			

**p<0.001
 *p<0.005
Source: own

Figure 2 indicates that 19.3% of the respondents agree that in the Foreman and Kennedy Road informal settlements there are stream channelization, 0.7% dams and 0.7% floodwalls respectively.

Figure 2. Community protection works available in communities
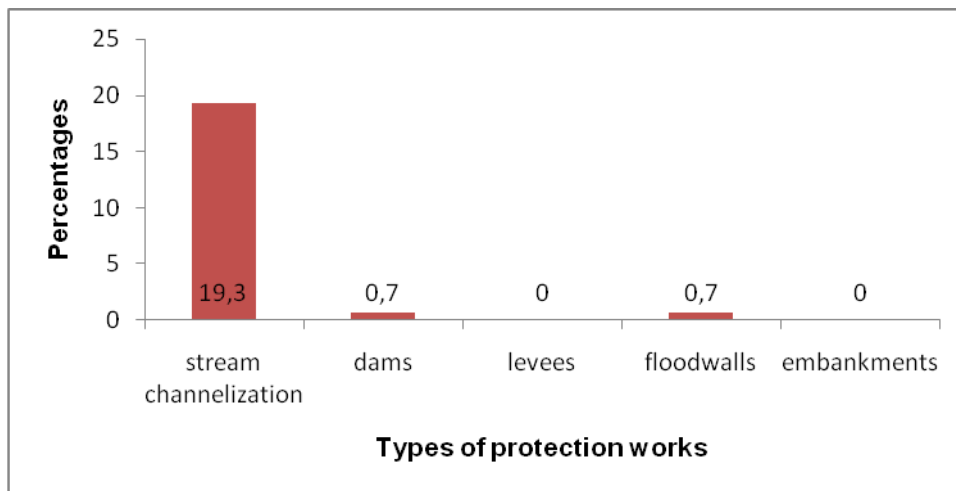
Source:own

Table 3 shows that the association between variables is not significant at the 95% level (p>0.05). The research findings reveal that 97.9% receive no information regarding disaster mitigation. The respondents agreed that there were no emergency preparedness handouts and other information distributed to their informal settlements on disaster or emergency management.

Table 3. Relationship between mitigation information provided in writing and the emergency preparedness handouts and other information distributed to the community on disaster or emergency management

Mitigation		Are there emergency preparedness handouts and other information distributed to your community on disaster or emergency management?						Chi-square	Df	P
		Yes		No		Total				
		N	%	N	%	n	%			
Has mitigation information been provided in writing to you?	Yes	0	**0.0%**	3	2.1%	3	2.1%			
	No	5	**3.6%**	132	94.3%	137	97.9%	0.114	1	0.736
Total		**5**	**3.6%**	**135**	96.4%	140	100.0%			

Source:own

Figure 3 indicates that 4.3% of the respondents agree that pamphlets were distributed to communities as an awareness strategy to disasters. The research findings indicates that 27.9% of the respondents receive disaster warnings from newspapers, 32.1% from television, 63,6% from radio and 2.1% from municipal officials respectively.

Figure 3. Kind of warnings
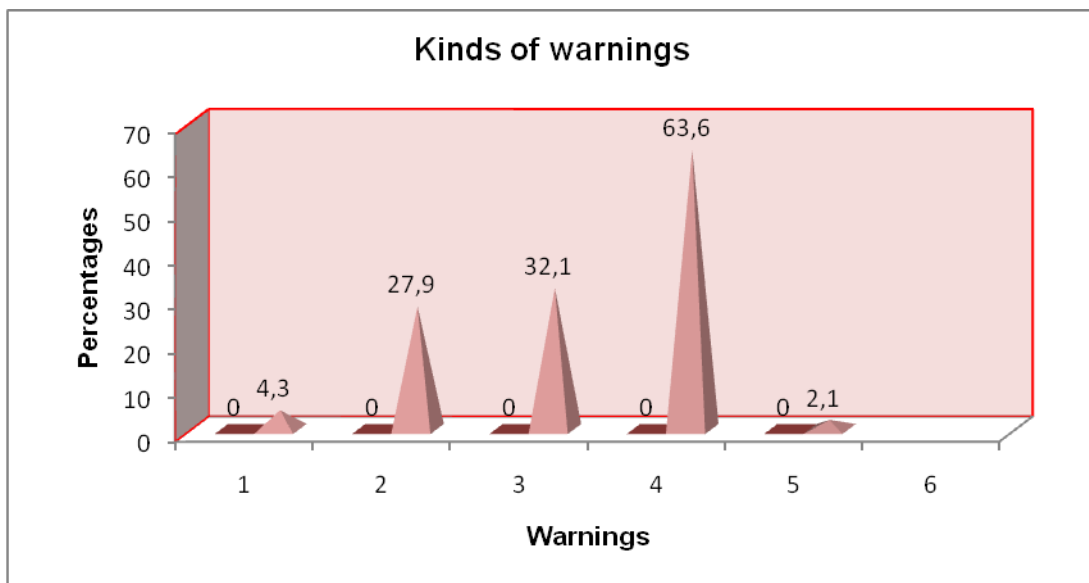
Source: own

Case of Foreman and Kennedy Road Informal settlements

According to Ward 25 councillor (Personal communication, 2009), the main causes of fires in the Foreman and Kennedy Road informal settlements include the following:
- Alcohol consumption;

- Fires 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 tribal groups).

The Manager of the eThekwini Municipality fire department (Personal communication, 2009) indicated that the Expanded Public Works Programme (EPWP) and Social Sector Programme developed a plan to ensure the safety of destitute and vulnerable persons and families, especially child headed households who live in unsafe and hazardous homes or shelters such as informal settlements. The plan is that the Ilima concept (each one help one) will be used to repair or rebuild a derelict dwelling. The pilot project has already been launched and there are potential partners who will assist in mobilising financial resources. The outcome of the Ilima project is that it revives the ubuntu (humanity) tradition of caring for one another.

The councillor (personal communication, 2009) who chairs the housing committee declared that the municipality is fast-tracking housing delivery as they build 17 000-20 000 low-cost houses a year. He said that the municipality is destined to clear out informal settlements and improve living conditions to help people to get out of the trap of poverty by 2015. The councillor further argued that landlords and businesses such as illegal taverns in the area were a hindrance to development initiatives that the council wants to implement. Furthermore, the councillor indicated that there are certain businesses and landlords that somehow, benefit from having people living under these conditions. He confirmed that the Mount Moria housing project in Durban would, when complete, benefit the Kennedy Road informal settlements within the 2009/2010 financial year ending.

eThekwini Municipality has approved a plan to provide an interim supply of electricity to 22 500 households in 572 informal settlements across eThekwini Municipality, in areas where full upgrades are planned for the future (Metro Ezasegagasini, 2009:3). The senior manager of the housing planning section said informal settlements across eThekwini Municipality have been divided into categories, based on their suitability for upgrading and a team appointed to roll out the project.

eThekwini Municipality infrastructure chairperson (councillor) (personal communication, 2009) said that the plan will curb illegal electricity connections and the sabotage of municipal services. He further stated that plans are in place to provide access roads and other basic services to informal settlements that were scheduled for upgrades in the coming financial years. The chairperson said that communal ablution blocks had been installed in most informal settlements, providing clean water and sanitation. According to the infrastructure chairperson, storm-water services for informal settlements would be incorporated into road designs and access roads to settlements which were crucial to aid disaster relief.

The senior manager in eThekwini Municipality's Electricity Revenue Protection Division (personal communication, 2009) indicated that plans were in

place to protect legitimate customers from interruptions caused by illegal connections. He further said that some low-voltage copper circuits were now being replaced with aerial bundled conductors to make it harder to tap into the line.

DISCUSSION

Based on the results of this article, several conclusions can be drawn. The article indicates a significant difference between sturdy and non-compliant building materials used to built the informal settlements. Choguill (1994:25-28) & Cobbett (1999: 1) state that, the increasing shortage and squalid conditions of housing is the outcome of a varied and complex set of causes such as mismanagement, bureaucracy, and lack of proper institutions, infrastructure and resources. The authors further allude that these settlements are generated by unrealistic building by-laws, high building standards and the exclusion of the target population from planning and implementation processes.

The steepness of the topography and building materials where these informal settlements are built without any structural mitigation in place contributes to the respondent's feelings of being unsafe. The article indicates that, fires in the aforementioned informal settlements are caused by combustible building materials which is sourced from the waste disposed from the nearby landfill site as well as the cutting of trees planted mainly for environmental protection. According to the Overseas Development Administration (ODA) (1992) and (Hardoy *et al.,* 1993), poor and desperate people not only suffer from environmental decline created by rapid uncontrolled urban expansion and inadequate policies, but also people become a cause of ecological deterioration by over-exploiting surrounding natural resources and by neglecting environmental quality under the pressure of survival.

The researcher found that the respondents who used timber as a building material felt unprotected and unsafe from floods. Furthermore, the overcrowding of people and the use of combustible materials for building purposes in these informal settlements, lack of electricity and the use of paraffin perpetuate fires. The physical vulnerability of human settlements is a manifestation of vulnerable socioeconomic conditions and institutional incapacity, which force people to expose themselves to risks in the first place (El-Masri & Tipple, 2002: 159-162).

Findings further reveal that in the Foreman and Kennedy Road informal settlements, community protection works such as drainage systems are not installed as a risk reduction strategy. According to El-Masri & Tipple (2002: 162), mitigation of natural disasters cannot depend solely upon technological solutions and should be based on a wide range of measures including engineering devices, land

management, social regulation and economic improvements.

The finding of poor knowledge of disaster management activities shows that eThekwini Municipality's programmes and projects are not proactive regarding the awareness of disasters. Furthermore, the channels of communication is ineffective, given the fact that shacks dwellers cannot afford to buy television set and radios because the majority are unemployed and the area does not have electricity to use such appliances. Local authorities should promote education, public awareness and training at the community level, by focussing on incremental infrastructure, upgrading and improved building construction and construction methods, improvement of traditional techniques, development of group-oriented activities, and dissemination of information and knowledge (Badshah, 1996:176-177).

CONCLUSION

It is clear from the findings of this research that poor legislative systems regulating human settlements and poor intergovernmental relations which do not complement each other's activities aggravate the mushrooming of informal settlements without mitigation strategies in place. Future research should identify ways in which hazard-prone informal settlements can be induced to reduce their vulnerability. Arising from the literature study, research methodology and the empirical evidence and discussion of results, the following recommendations are proposed:

- eThekwini Municipality should integrate disaster management plans into the IDP of the municipality and should be underscored by the commonality between mitigation issues and new roles for local government which focus on the provision of basic services, the creation of job opportunities, economic and social development, the eradication of poverty and promoting democracy.
- eThekwini Municipality should build low-cost houses and include hazard mitigation objectives in their everyday investment policies to reduce community hazard vulnerability.
- The council should develop a system to classify hazard mitigation strategies in terms of five categories which are hazard source control, community protection works, land-use practices, building construction practices and building contents protection.
- It should work collaboratively with other agencies whose work helps to prevent fires and improve response systems or strategies, for example, rapid road access, road naming, and house numbering, providing fire-fighting water in hydrants, street lighting, and telecommunications.
- Mitigation strategies with technical tools should be designed to determine where the floodplains

are in the communities in order to steer development away from such areas using maps.
- Once the area has been identified as the high risk zone, eThekwini Municipality must embark on a "sustainable mitigation" approach which encourages community participation, monitoring and involvement of communities in decision-making.
- eThekwini Municipality must institute a three metre wide break programmes to all informal settlements to prevent fires from escalation.
- eThekwini Municipality must provide basic services including water, electricity, and sanitation and refuse removal to all informal settlements suitable for further upgrading.
- The council should have a designated media contact person on disaster management to improve awareness strategies and cascade information to the informal settlements.

The above excerpt shows that municipalities should adhere to the legislations and international conventions pertaining to disaster mitigation as it will enhance intergovernmental and interdepartmental relations as roles and responsibilities will be clearly defined. Furthermore, compliance to disaster mitigation strategies will assists in mobilising communities with intergrated skills and promote output oriented communication strategies which are tailor-maid for that particular high risk area.

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