Level of Fire Disaster Awareness in Buildings within the Nairobi Central Business District

Joan Jelimo Ayabei

Master of Science Degree in Disaster Management and Humanitarian Assistance of Masinde Muliro University of Science and Technology

Abstract- This paper is a summary of findings of a research established to assess the level of fire disaster preparedness in buildings within the Nairobi Central Business Area. The data examination was focused on the level of fire disaster preparedness of Tenants, Landlord and Building occupants.

The results showed that the effects of presence of hazards in buildings 66.5% (R^2 0.651) can be explained by presence of hazards and vulnerabilities leaving 34.9% of the variability in preparedness to be accounted for by other variables. The results further revealed that the level of preparedness and fire safety awareness accounted for 66.5% (R^2=0.665) leaving 33.5% of the variability in fire safety management to be accounted by other variables. Influence of bylaws on fire disasters 62.1% (R^2 0.621) can be explained by lack of adherence to by laws leaving 37.9% of the variability in preparedness to be accounted by other variables. The level of fire safety awareness is very low as 55% of the respondents indicated that they had not been trained on fire disaster preparedness. This in essence implies that the people are exposed to fire disasters and the level of preparedness is low.

***Index Terms*-** Disaster, Hazards, vulnerability, disaster preparedness, Fire Safety Awareness, Fire safety, Hazardous chemicals, variability.

I. INTRODUCTION

Buildings and other infrastructure require fire protection to facilitate their regular functioning and service delivery. Protection of buildings is not only necessary for such purposes, but also for the safety of the users. Experience has shown that much emphasis has been placed on ensuring that equipment and various means against fire hazards are put in place in buildings. The Government of Kenya by-laws on building codes stipulates that every building with more than one storey should be installed with a number of facilities for firefighting. It does not however compel the building owners to conduct training of the building users so that they can acquire some knowledge on the use of the facilities. Lack of knowledge on how to use the equipment, lack of fire equipment and means against fire hazards could render attempts to contain fire outbreaks at their preliminary stage almost impossible.

The human population of Nairobi according to 2009 census was 3,138,369 million and is continuing to grow at an annual growth rate of 4.5% (KNBS, 2009). In tandem with population growth, many buildings have been constructed which continue to increase in number and complexity,but many have inadequate or no fire safety measures (Celly, 1999).

In response, NCC and other players have tried to reduce fire disasters including conducting annual building inspections, approval of building plans, forming fire training schools and equipping all this facilities for fire disaster preparedness and compliance. Despite all these efforts, fire incidents in NCBD continue to rise with increasing frequency and severity.

Consequently, there is need to identify the underlying causes of city fire disaster and provide a holistic and sustainable solution to fire disasters in NCBD.

II. REVIEW OF LITERATURE

2.1 Level of Fire Safety Awareness

This is the ability to recognize the danger of fire, ability to know what to do to prevent fire as well as what action to take in case one happens. All fire disaster preparedness is based on the knowledge about fire hazards, the likelihood of different causes of fire outbreaks and the likely effects on the built and natural environment (Comolotti, 2004). He says people with knowledge about fire disaster will acquire equipment's such as fire extinguishers, fire blanket and smoke detectors among others to support response activities. They also prepare their families and employees to take immediate action to prevent death injury and destruction of property whenever disaster strikes. Safety regulations in U.K impose mandatory fire safety training to all employees working within a building, a construction area or any other busy area which helps provide employees with crucial information, develop skills such as those used in operating fire extinguishers and proper escape behaviors (Sime, 2001).

Wood (1990) explored levels of awareness of and preparedness for fire disaster in community members in Queensland and found that the level of fire safety awareness has direct influence on the level of preparedness. He says being ignorant of dangers of fire makes people ignore the installation of firefighting gadgets which will help save life and property in case of fire outbreak. He also found that poor awareness of fire caused a lot of fire outbreaks while good knowledge enabled people to know the possible fire risks in ones premises. This study supported the more intensive and comprehensive capacity building in order to instill the need of preparedness (Wood, 1990).

In a study conducted in Oshogbo in Nigeria to assess the relationship between levels ofawareness and disaster preparedness found, that 73.4% of houses studied had "burglary proofs" installed on windows, doors and sometimes the veranda. Out of those interviewed 64% said they had never thought of the implication in case of fire outbreak. To them this is a security measure aimed at preventing robbers from gaining access to the

house. The escape of inhabitants of a house, who commonly get trapped by the rigid non-removable metals in case of fire, become difficult (Bukowski, 2006).

Incidents of fire outbreaks in Tanzania will not go down unless peoples level of awareness of their duties to prevent fire is raised (Mfinanga, 2007). Mfinanga also noted that most people do not know that it is their responsibility to prevent fire outbreak and the first response is to call fire fighter as portrayed by one of a stall owner in Mchikichini market in Tanzania where 80 stalls were destroyed by fire who asked, "Is it our responsibility to fight fire?" While reacting to the question what steps the businessmen took to ensure that such incidents never reoccur again. To him it is the duty of the fire fighters.

People who regularly visit or use buildings or even visitors should be aware about the presence of the exit door which should not be blocked with anything and with proper signage showing the path out (Odour and Atsiaya, 2004). They said that observations show that in most of the buildings in Nairobi there were locks on doors while grilled outdoors were also locked a situation that presents doubts on their usability for escape purposes during emergency. They also noted that in most of the buildings, especially the storey ones, escape routes are a fare tales and therefore when fire breaks out, people crumble in one staircase exposing them to more danger of fire. Many of the surveyed buildings, fire disaster may hardly be escaped using the emergency exits since many do not know the location of fire exits. However the location of fire escape ways does not necessarily imply easy access through the ways as one of the respondents was quoted saying "the escape ways are known to many but the environment is not welcoming : stairs are old ;the exit doors are regularly locked ,whereas the keys to are with the

watchmen downstairs". Worse still the respondent did not know among the watchmen held the key (Odour and Atsiaya, 2004).

III. PURPOSE OF THE STUDY

This study was undertaken after several rampant cases of fires had been reported in different parts of the country hence raising fears on the issue of fire preparedness and safety measures in place. This study thus sought to investigate fire disaster preparedness in the NCBD as the frequency of fire disasters in NCBD has been on the increase and there are no documented findings on the holistic state of the fire disaster preparedness in NCBD. The need to unearth the underlying causes of these disasters is urgent.

The findings of this study can assist in formulating fire preparedness measures in buildings to mitigate fire disasters. Furthermore, the study will propose the changes that need to be put in place in order to comply with the fire disaster preparedness codes. This may go a long way in minimizing disasters within the NCBD. There is a gap in the knowledge on whether or not the said weakness is due to limited awareness and knowledge on fire protection/fighting equipment or lack of firefighting equipment in buildings.

IV. FINDINGS OF THE STUDY

2.1 Awareness of Fire Safety Laws among the respondents

The researcher sought to determine the level of fire safety awareness among building occupants and the results is as shown in figure 2.1
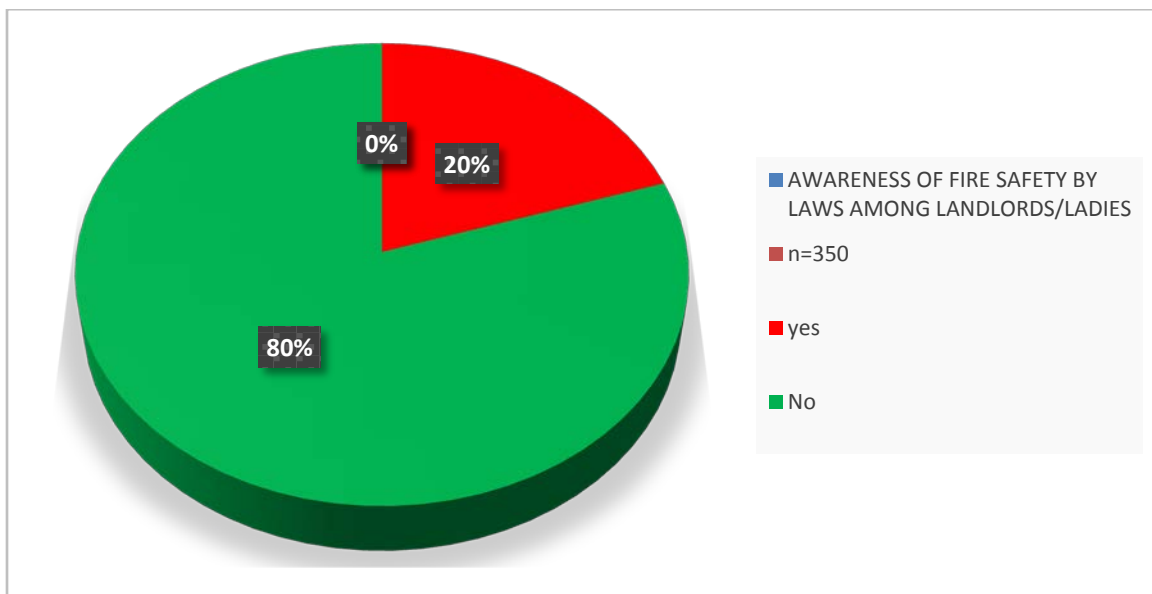

Figure 1.1: Awareness of Fire Safety Laws among the respondents (source: Field data, 2014)

The results obtained from questionnaire to Landlord and tenants 280(80%) were unaware of fire safety laws and 70(20%) were aware of the fire safety by laws. Fire safety awareness helps to recognize the danger of fire, know what to do to prevent fire as well as what action to take in case one happens. People with knowledge about fire safety will purchase fire devices and

also prepare their families and employees to take immediate action to prevent death, injury and destruction of property whenever disaster strikes (Perrow 2005).

Report from Focused discussion group and key informant interviews revealed that most building do not have enough fire exits, there is non-existence of well-lit fire exits, emergency

doors not sufficient as they were blocked/locked. The number of occupants to the building are not controlled hence go beyond required standards all these factors expose the building occupants to vulnerability in the event of fire.

4.2   Awareness of fire risks among the Landlord/Ladies and Tenants

The study sought to find out whether respondents are aware of fire risks that they are exposed to in their buildings as this increases the level of fire safety which is viewed to influence level of fire disaster preparedness. The findings are as illustrated in Table 5.1

Table 2.1: Fire disaster risks (Source: Field data, 2015)

Category	Landlord/Ladies		Tenants	
	Frequency	Percentage	Frequency	Percentage
Do you have emergency escape routes				
No response	33	30.0	55	23.9
Yes	42	35.0	84	36.5
No	45	37.5	91	39.5
Housekeeping standards				
No	79	65.8	171	30.8
No response	25	20.8	39	16.9
Yes	16	13.3	20	8.6
Stock of combustible materials				
No response	36	30.0	70	30.4
Yes	61	50.8	112	48.6
No	3	2.5	9	3.91
Awareness of use of fire extinguishers				
No response	9	7.5	9	3.91
Yes	45	37.5	100	43.4
No	66	55.0	121	52.6

Table 2.1 indicates that there is no enough escape routes in buildings 45 (37.5%) response from landlords and 91(39.5%) tenants respectively.   There is poor housekeeping standards 79(65.8%) and 171(30.8%) from Landlords and Tenants respectively.   66(55.0%) and 121(52.6%) respectively from Landlords and tenants respectively. Most respondents were unaware of how to use fire extinguishers 66(55.0%) and 121(52.6%) absence of safe fire assembly which exposes the building occupants to so much vulnerability in the event of outbreak of fire.

Results from Focused group discussion revealed that majority of buildings occupants were unaware of how to use of extinguisher, there was noted absence of proper housekeeping standards, most buildings do not have doors to exist as most were blocked/locked. Presence of assembly points observed in most

building but small and not clearly labelled and most of the time occupied as parking area. This was noted to expose the building occupants to a lot of danger in the event of outbreak of fire.

4.3   Awareness of fire response/control measures among respondents

Table 2.2: Fire Safety Awareness among respondents (Source: Field data, 2015)

The study sought to find out whether respondents are aware of fire risks that they are exposed to in their buildings as this increases the level of fire safety which is viewed to influence level of fire disaster preparedness. The findings are as illustrated in Table 2.1

Table 2.2 Fire safety Awareness among respondents

Category	Frequency	Percentage
Number of times the tenants attended Fire Safety training		
|No response	13	3.7
Never	177	50.5
Once	88	25.1
Twice	65	18.5
Fire outbreak response among		

Landlords/Ladies/Tenants

Shout/Scream	72	20.5
Call fire brigade	94	26.8
Call police while helping to put off fire	57	16.2
Try to safe life and personal property	39	11.6
Pour a lot of water	24	6.85
Switch off Electricity Appliances	23	6.57
Use fire blanket	25	7.1
Use Available Fire extinguisher	20	5.71
Use escape routes	17	4.8
I don't know what to do	13	3.7

The results in table 5.2 indicate that most of the tenants have not been trained in fire safety 177(50.5%) and also unaware of what how to respond in the event of fire outbreak 94(26.8) would shout/scream, call fire brigade and many opted for other available options.   Hence this is an indication that most respondents are not aware of their obligation that is to ensure their own individual safety in the event of fire outbreak. Instead they would resolve to calling fire brigade, shouting/Screaming.

4.4 Factors determining awareness Levels among Landlords/Tenants (Source: Field data, 2014)

The researcher computed the mean index of the level of preparedness by the number of times

The respondents have attended training on fire safety preparedness and the results are given below. The researcher has used post hoc method for pair wise comparison to establish the influence of the training on the level of preparedness among the tenants.

In the study the researcher sought to find the percentage of landlord/Ladies and tenants who attended training and the results is as discussed in Table 5.3 below.

Table 2.3: Level of Preparedness among Respondents who have attended training on fire Safety measures

	F	Mean
Never	205	85.33
Once	106	140.34
Twice	39	175.01

_____

_____

Table 5.3, F represent the number of the landlords/landladies who participated in the research. There were only three categories of the respondents and the computed mean indices were 85.33,140.33,175.01 for never, once and twice respectively. These results show that the landlords with the highest mean index were better on fire safety preparedness and vice versa. This implies that the respondents who have been trained twice are better than those who have been trained once or never. Since majority of the landlords/ladies/tenants have not adequately been trained on fire safety their level of preparedness is low.

4.5 Level of Preparedness among Landlords and Tenants who have attended Training on

FireSafety Measures

From the results in table 5.3 the research further sought to find out the relationship between level of training and fire safety awareness and the results revealed that 66.5% (R^2=0.665) can be explained by training, leaving only 33.5% of the variability in fire safety management to be accounted by other variables. Training of   building occupants contributes ($p<0.05$) significantly to fire safety awareness.

Information from Key Interview Informants and focused group discussion revealed that factors determining preparedness was majorly training on awareness of fire measures, use of firefighting equipment, escape routes, obligation of Landlords/tenants on fire safety, by laws especially of workplace/buildings and their responsibility in the event of fire outbreak.

V. DISCUSSIONS

The findings revealed that the level of fire safety awareness is very low among the respondents in the Central Business District of Nairobi. This explains why they do not know how to prevent outbreak of fire or even deal with it if it occurs. This is greatly contributed by the fact that most of them have not been trained on fire safety preparedness. These findings are in line with those of Wood (1990) who sought to explore the levels of awareness and preparedness for fire disaster in community members in Queensland. He found that the level of fire safety awareness has direct influence on the level of preparedness.

There is also a clear indication that majority of the people do not know that it is their responsibility to be prepared with fire safety devices that can help them in the initial stages of fire outbreak and the only option is to call the fire brigade. This state of affairs can be attributed to lack of training. These results support a study done by Mfinanga (2007) in Tanzania which revealed that magnitude of fire destruction will not go down unless people's level of awareness of their duties to prevent fire is raised. Mfinanga also noted that most people do not know that it is their responsibility to prevent fire outbreak and the first response is to call fire fighters.

Findings revealed that some buildings within the Central Business Area are not safe since they are not served with fire safety devices. The occupancy levels in many of the buildings exceed the recommend standards as per National planning and Buildings Regulations, 2009. Most of the buildings had the doors to their escape routes blocked with no fire safety devices, hazardous chemicals stored inside their premises, non-existence

(overlapping text fragment:) **Std. Deviation   Std. Error**
61.63   7.34
90.05   21.15
40.53   18.57

of emergency numbers exit doors did not have signage to the escape routes missing.

It was further established that the effects of presence of hazards in buildings 65.1% ($R^2 = 0.651$) can be explained by presence of hazards and vulnerabilities leaving 34.9% of the variability in preparedness to be accounted for by other variables. Hazards and vulnerabilities contribute ($p<0.05$) significantly to fire disaster preparedness.

Majority of buildings occupants were unaware of how to use of extinguisher, there was noted absence of proper housekeeping standards, most buildings had doors to fire exit blocked/locked. Presence of assembly points observed in most building but small and not clearly labelled and most of the time occupied as parking area for vehicles and most of the building occupants had not been trained in fire awareness. Most respondents had low perception of the implementation of NCC by- laws. The numbers of prosecution, penalties, and fines for non-compliance is low compared to a population of over 3 million residents living in the Nairobi City Council.

The influence of by- laws on fire disasters 62.1% ($R^2 = 0.621$) can be explained lack of adherence to by laws leaving only 37.9% of the variability in preparedness to be accounted for by other variables. Hazards and vulnerabilities contribute ($p<0.05$) significantly to fire disaster preparedness.

REFERENCES

[1] Alexander, D. (2002). Principles of emergency planning and Management. Harpenden: Terra Publishing.

[2] Arleck and Settle. (1995). The Survey Research Handbook. New York: Irwin Press.

[3] Arturson, G. (1992). Analysis of severe fire disasters. Publishers, Dordrecht/ Boston/ London, 24-33, 1992.

[4] Blanche, M.T, Durrham, K. and Painter D. (2006) research practice (2nd edition), Cape Town, UTC press.

[5] Blaikie, p. (1994). Pp. 3-32 in At Risk: Natural Hazards, People's Vulnerability, and Disasters. London and New York: Routledge.

[6] Bukowski,R.W.,Nuzzolese,V., and Bindo, M. (2001). Performance-based Fire Protection of Historical Structures. Fire Safety in Buildings Forum, Milan, Italy, pp. 39 -51.

[7] Bryman, A. (2008). *Social research methods* 3rd edition. Oxford: Oxford University Press.

[8] Bos, Carole (2013)."Hindenburg Expert - Dr. Addison Bain" AwesomeStories.com. Oct 07, 2013. Mar 23, 2016. https://www.awesomestories.com/asset/view/Hindenburg-Expert-Dr.-Addison-Bain//1

[9] Carr, Lowell, (1932). "Disaster and the sequence-pattern Concept of Social change." American Journal of sociology 38:207-218.

[10] Celly, R. (1999). Dimensions of natural *disaster* management in India. Gupta, T.N. S.l, Champion, B. (1976). Methods and issues in Social research, social sciences, methodology and research, New York, 1976.

[11] China Daily (2011). Eight United states Cities – New York, San Francision, Washington DC, Chicago, Los Angeles, Houseton, Seatle and Atlanda.

[12] Cochran, W. G. and Cox, G. M. (1977), Experimental Designs, Second Edition, New York: John Wiley & Sons

[13] Cohen, J. (1988). Statistical Power Analysis for the behavioural sciences (2nd Edition ed.). Hillsdale: NJ:Erlbaum.

[14] Cooper, D.R. and Schindler, P.S. (1998). Business Research Methods (6th Edition ed.). new York: Irwin Press.

[15] Connaway, L.S.Ronald R. P. (2010). Basic research methods for Librarians 5th Edition. ABC –CL, 2010.

[16] Comolotti , J . (2004). The importance of school fire drills . Retrieved March, 2012, from http:// www.fa.com.

[17] Cumming, S. (2012). Effective fire suppression in boreal forests. Retrieved January 13th, 2013, from Wikipedia: www.wikipedia.org

[18] Dailey, W. (2000). Guide to Fire Safety Management. Leicester: perpetuity Press

[19] Derek, J. (1986). Fire Prevention Handbook. London: Butterworth and company (publishers) Limited.

[20] Drabek, T. E. (1986). Human System Responses to Disaster. New York: Springer-Verlag.

[21] Dynes, R and Russel, N .(2002). A prospective on Disaster Planning. Disaster Research Centre: Delaware

[22] Erickson, M. F., Egeland, B., & Pianta, R. (1989). The effects of maltreatment on the development of young children. In D. Cicchetti & V. Carlson (Eds.), Child maltreatment (pp. 647-684). New York, NY: Cambridge University Press.

[23] FEMA (2007). U.S. Fire administration. Fire death rate trends. An international perspective. Contract No. EMW 95-c-4717. Washington, DC:Federal Management Agency, , National fire Dale Center.

[24] Falkenrath, R. (2001). Problems of Preparedness: U.S. Readiness for a Domestic Terrorist Attack. Retrieved January 3rd, 2013, from FEMA Ready website: www.wikipedia.org/Federal emergency Management Agency

[25] Festus, M.O. (2001). Fire disasters in Nairobi City destroys property worth millions of property and lives lost. Standard newspaper Kenya 2001.

[26] Francis, L. (1990). Building construction for fire services 3rd SPFE and Harry R.Carter, edition

[27] Grant, C. (2012). History: National Fire Protection Association. Retrieved March 2, 2013, from Wikipedia: www.wikipedia.org/nationalfireprotectionassociation

[28] Government of Kenya (2000). Population and Ins fracture development of Nairobi.

[29] Government of Kenya (2001). Disaster in Kenya a major public concern in Management of Schools in Kenya.

[30] Government of Kenya (1999). Growth of Nairobi in relation to the Uganda railway Mombasa to Kisumu.

[31] Government of Kenya (2004). National Policy on Disaster Management Revised draft Nairobi Kenya.

[32] Government of Kenya (2009). Draft National Policy for Disaster Management in Kenya.

[33] Gunn, S.W.A. (1990). Multilingual Dictionary of Disaster Medicine and International Relief, Kluwer Academic Publishers.

[34] Grass Fire Act (cap327) Laws of Kenya, 2012, National Council for law reporting with authority of the attorney general.

[35] Hall, R. (1997). The lowdown on high - rise fires. NFPA Journal, November/December, 84-90.

[36] Hurley Management Consultants (2006). Empowerment. Available at http//: www.hmc.ie/article

[37] Institute of fire engineers India (1996). Executive Committee member seminar fire and Safety. IFEI engineering department news.

[38] International Red Cross(1996), Fire-fighting tools and equipment in the event of disasters. IFC newsletter.

[39] International Building code (2011), International Code Council, 5203 Leesburg Pike, Suite 600, Falls Church, Virginia 22041-3401. (Phone 703-931-4533).

[40] ICRC (International Committee of the Red Cross and Red Crescent Societies).2000. World Disasters Report. Geneva.

[41] International Federation of Red Cross and Red Crescent Societies (2009). Disaster Risk Reduction. Geneva 19. Switzerland

[42] Kathuri, J.N. and Pals, D.A. (1993). Introduction to Educational Research. Njoro: Egerton University Press.

[43] Kartez, K., Lindell, L.,Muichael, K., Ronald, W. ,Perry, N., and Marjorie R. (1980). " Race and disaster warning response. "Seattle, WA" Betelle human Affairs Research Centers

[44] Kenya Red Cross Society (2009) (a). Fire disasters and rescue operation in Kenyan fire disasters. KRCS newsletter unpublished

[45] Kenya National Bureau of Statistics (2009) (b). Kenya Population Census, 2009, Analytical   Vol. III; population dynamics in Kenya, Nairobi Kenya

[46] Kenya National Bureau of Statistics (2009). Alternate name formerly Central Bureau of   Statistics abbreviation. KNBSparent Department

[47] Kombo,D.K. and Tromp, D.L. (2006). Proposal and Thesis Writing: An Introduction.

[48] Nairobi: Tromp Paulines Publication.

[49] Kothari, C.R. (2003). Research Methodology, Methods and Technoques. New Delhi: Wishwa Prakshan.

[50] Kothari, (2006). Research methodology. Methods and Technology, 2nd ed. New Delhi,   Wishwa pora kashan

[51] Kidd, S. (1995). Heritage Under Fire: A Guide to the Protection of Historic Buildings, London Fire Protection Association.

[52] Lester, R. (2009). Report on catastrophic fires in major cities of the world. London Publishers limited 2009 3rd Edition.

[53] Masellis, M. (1991). Thermal agent disaster and fire disaster Definition, damage, assessment and relief operations, Ann. Medit. Burns Club, 4: 215-8,

[54] Masellis, M., Ferrara, M.M., Gunn, S.W.A (1992). Immediate assistance and first aid on the spot in fire disaster - education of the public and self-sufficiency training, Medit Burns Club.

[55] McFadden, R. (1989). Victims Errors Blamed in Fire Deaths. Retrieved May 3rd, 2013,   from Fire and Life Safety Education, Manitoba: www.wikipedia.org/firea and life safety education

[56] Mfinanga, D. A. 2007. Parking generation by facilities in the CBD of Dar-es-Salaam   City. The Journal of Building and Land Development, 14 (2):83-99

[57] Mugenda, O. M. and Mugenda, A. G. (2003). Research methods; quantitative and qualitative approaches. Nairobi: Acts Press

[58] Mbwesa, K. J. (2008). Introduction to management research. A student Handbook. Nairobi: Basic Modem Management Consultants.

[59] National Fire Incident Reporting System (1996-1998). and the National fire protection   Association's (NFPA's 2007) annual survey, fire loss in the United States.

[60] Nairobi City Council (2011). Tom Mboya Street, Fire Department, Nairobi Kenya Central Business District association (2007). Kenya fire tragedies.

[61] National Fire Protection Association (2007). Standards of National fire protection Association. National Fire Protection Association, Quincy, MA (2012)

[62] NEMA (1999). Kenya National Environmental Management Authority – Kenya Fema Publications, 1997, North Westshore Building, Ste 208 Tampa, fl 33607 www.ibhs.org.12/12/2014.

[63] NDOC (2009). Draft National policy for disaster management in Kenya.

[64] Oduor A, and Atsiaya, (2004). Two fire attacks fail to break school's spirit. East. African Standard. Schools & career Nairobi: The Standard Pp.

[65] Omuterema, O. Neyole E., Tabitha M, and Dan O.,(2009). An Assessment of Main   Aspects of Sachangwan and Nakumatt fire disasters in Kenya disasters urban   and rural setting.

[66] Osborne, G. and Gaebler, N. (1992). Reinventing Government policies in major cities. Addison – Wesley, MA

[67] Peakin,(1999). Economies in Transition: conception, status and prospects edited by Allan Young, Ivan Teodorovic. Amazon.com.

[68] Perry, R.W. 1991. "Managing disaster response operations, "pp. 201-2231 in T.E. Draben and G.S. Hoetmar (eds) Emergency management: Principles and Practice   for local Government Washington, DC: International City and County Management

[69] Perry, R.W. (1987). Disaster preparedness and response among minority citizens.   R.Dynes, B. Bemarch and C. Celanda (Eds) sociology of Disasters .C. Italy.

[70] Perrow, C. (2005). "Normal Accidents: Living with high risk technologies. 2nd edition   Princeton:Princeton University Press.

[71] Proulx, G. (1999). How to initiate evacuation movement in public buildings Facilities. Vol. 17,pp. 331- 5.

[72] Reuters (2007). California fire displace 250,000, East African Standard, Kenya October, 24, 2007.

[73] Tobin, Graham A. and Burrell E. Montz. 1997. Natural Hazards: Explanation and Integration. New York: Guilford Press.

[74] Safer Cities (2000). Building Safer Cities: The future of disaster Risk Reduction. Safer   Cities. The World Bank Disaster Management Facility Washington, D.C.

[75] Sime, J. (2001). Escape behavior in fires and evacuations. (In stollard, P. and Johnston, l. eds Design against fire, an introduction to fire safety engineering design. London E & FN SPON. P. 56 -87).

[76] Singapore daily, (1999). Remembering the Samsui women: migration and social memory in Singapore and China. Amazon.com.

[77] Stocks, B. (1991). The Extent and Impact of Forest Fires in Northern Circumpolar   Countries.   Retrieved   January   13,   2013,   from www.wikipedia.org

[78] UNISDR (2002). Living with Risk, A global review of Disaster Reduction initiatives,   United Nation Geneve, Switzerland.

[79] Watts, J. M. (1997). Analysis of the NFPA fire safety evaluation system for businessOccupancies. Fire Technology. David Fulton Publishers.

[80] Wilbanks, T. (2007). "The Research Component of the Community and Regional Resilience Initiative (CARRI)". Presentation at the Natural Hazards Center, University of Colorado-Boulder.

[81] Wambayi, O.G.W., (2007). Fire Prevention and Protection. Fire Marshall Course. E-   laws Ontario.

[82] Wood, C. (1990). Status of canary rockfish in the INPFC Vancouver, Columbia and   Eureka Regions and Recommended ABC for 91. Pacific Fisheries Management   Council.

[83] Zmud,M.(2008). Public Perceptions of High-rise Building Emergency Evacuation preparedness – fire technology United States.

AUTHORS

First Author – Joan Jelimo Ayabei, aster of Science Degree in Disaster Management and Humanitarian Assistance of Masinde Muliro University of Science and Technology