IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 3 Issue 5, May 2016.
www.ijiset.com
ISSN 2348 – 7968

Fire Vulnerability Assessment of the Federal Capital City, Abuja, Nigeria

[1]H.K Ayuba, O. Aguocha[2] and N.I. Medugu[3]

[1, 2 and 3] Department of Geography, Nasarawa State University, Keffi, Nigeria

Abstract: The Federal Capital City (FCC), Abuja like every other major city is constantly faced with the problem of fire outbreak. This study assessed the spatial distribution of fire stations in the FCC and the level of vulnerability of various districts to fire hazard. Global Positioning System (GPS) was used to identify the locations of fire station serving the FCC. Geographic information system (GIS) was used to produce fire vulnerability map of the FCC. The result of the study revealed that fire stations in the FCC are unevenly distributed and that Wuse and Maitama districts are the most vulnerable to fire hazard while Asokoro district is the least vulnerable. It was recommended that the FCT Fire Service should adopt a scientific approach in determining the appropriate location for fire Stations in the FCC and that at least 2 additional Fire Stations should be sited in Maitama and Wuse Distrcts.

1. Introduction

2012). Nigeria has witnessed several disasters in the past. These catastrophic events have led to loss of lives and the destruction of properties. There is a steady rise in the number of fatalities from several types of disasters globally. In the past two decades, on average, more than 200 million people have been affected every year by disasters (HFA, 2005).Disasters regardless of severity generally cause either loss of lives or properties or both. To mitigate these losses, emergency responders or emergency response teams such as the fire fighting teams, medical teams, police, Red Cross and civil defence are vital. Their speedy, quick and prompt responses, under these circumstances may determine one's life and death and the degree of destruction of properties involved. The slower the response the worse the damage caused.

Hazards in Nigeria occur in the form of drought, desertification, flooding, epidemics and coastal erosion, building collapse, fire outbreak, air crashes and bomb explosion. The Federal Capital Territory (FCT), Abuja has had its fair share of disasters. These disasters have been in the form of flooding, building collapse, fire outbreak, terrorist attack etc (Vanguard, August 8, 2012). According to the Punch Newspapers, the FCT recorded 368 fire outbreaks which claimed 262 lives in 2011. It also reported that between January and June 2012, fire outbreak in the FCT resulted in the death of 12 persons and over N12 billion worth of properties

ISSN 2348 – 7968

destroyed. In 2011 Nigerian Fire Fighters carried out 11,284 operations with 7,129 of them on fire incidents (National Capacity Assessment Report

This paper is aimed at assessing the spatial distribution of fire stations in the FCC as well as the vulnerability of the five districts in the Federal Capital City (FCC), Abuja to fire hazard.

2. The Study Area

The Federal Capital Territory, Abuja is the capital of Nigeria. Abuja is found on latitude 7° 25'' and 9˚ 20'' North of the Equator and longitude 5˚ 45'' and 7˚ 39'' East of the Greenwich. It is bordered to the north by Kaduna state, to the east by Nasarawa State, to the west by Niger State and to the south by Kogi State (Figure 2). Federal Capital City (FCC) is located on the North Eastern part of the FCT. It covers an area of 713km^2 and has a population of 776,298 as at 2006 population census with a growth rate of 9.3%. As at 2012 it has an estimated population of 979,876. According to Mabogunje (1976) the area is considered the most ideal and conducive for human habitation and settlement development within the FCT. The area is characterized by a highly dissected terrain and is the highest part of the FCT with several peaks that are 760m above sea level (Balogun, 2001). The geology of the area is underlain with basement complex rocks.

The FCC consists of five districts, namely: Maitama, Wuse, Central Area, Asokoro and Garki, with two distinct seasons namely the rainy season that begins around March and runs through October, and the dry season which begins from October and ends in March. However between these seasons is a brief harmattan season that is occasioned by the north east trade wind and the attendant dust haze, increased cold and dryness. Weather conditions in Abuja are influenced by its location within the Niger-Benue trough on the wind-ward side of Jos Plateau and at the climate transition zone between the essentially '' humid'' south and the ''sub humid'' north of the country. The climatic dictates of the FCT are essentially from the south west to the north west due to rising elevations from the Gurara valley in the south west to the Bwari- Aso hills, Angwa-Karu hills to the north east (FCTA). The annual rainfall is highest within the FCC and its environs which is about 1,631.7mm. The annual mean temperature ranges between 25.8 and 30.2˚C (Adekayi, 2000; Balogun 2001).

ISSN 2348 – 7968

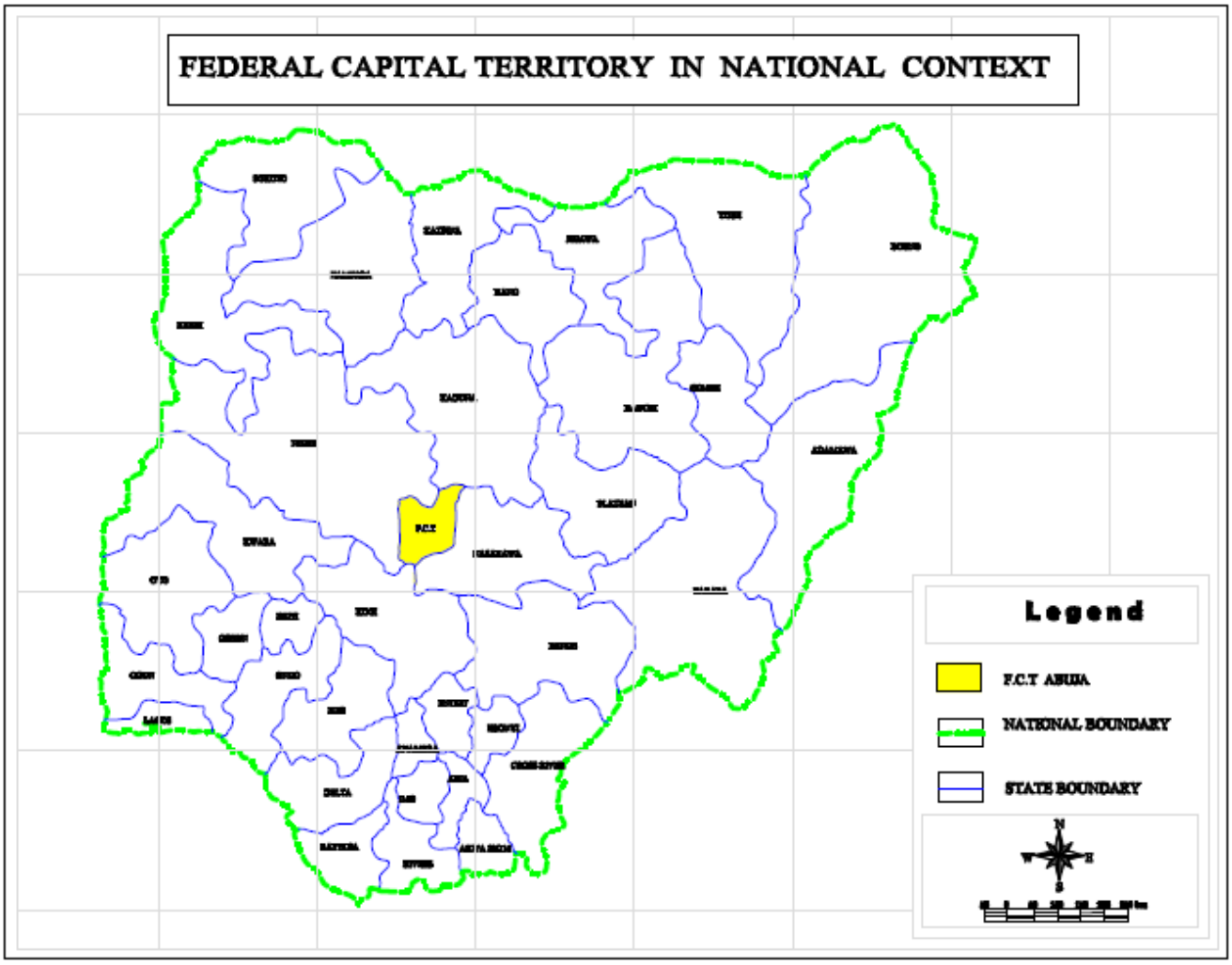

Figure 2 :Nigeria showing the FCT

3. Research Methodology

This study entails the preparation of fire vulnerability map using distance from fire stations to the five districts in the FCC as an indicator. Global Positioning System (GPS) was used to identify the locations of fire stations in and around the FCC. Using five minutes as response time, a travel time model map from the fire stations to the five districts in the FCC was prepared. ARC GIS 10.0 was then used to prepare a fire vulnerability map.

ISSN 2348 – 7968

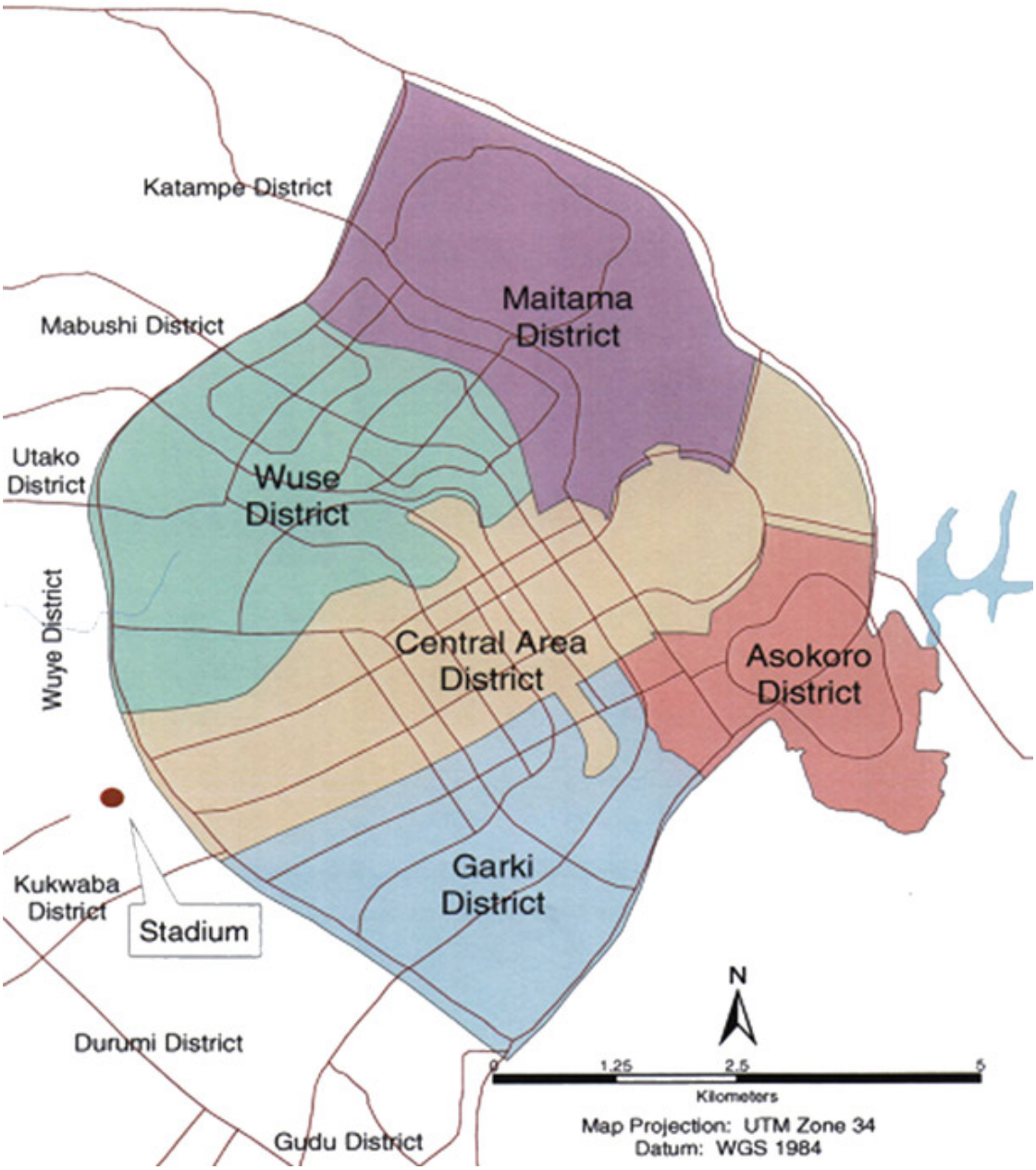

Figure 3: Map of the FCC, Abuja

4. Findings and Discussion

Figure 4 shows the spatial distribution of fire stations within the Federal Capital City, Abuja. The map indicates that there are eight (8) fire stations that serve the FCC. As indicated earlier in this study, the Federal Capital Territory Fire Service adopts five (5) minutes as its standard

ISSN 2348 – 7968

response time. A travel time model map was constructed using 5, 6 and 7 minutes travel time as shown in figure 5

From figure 4 areas in pink (parts of Asokoro, Central Area and Garki Districts) are considered to have very good coverage, i.e. they are within the 5 minutes recommended response time. Areas in light blue (Utako, parts of Gwarinpa, Gudu) indicate locations within 6 minutes response time, this falls outside the recommended response time, hence they are considered to have a poor coverage. Areas with dark blue (Maitama, Katampe, Mabushi) shows locations within the FCC that are covered within 7 minutes response time, thus having a very poor coverage.Those areas deemed to have poor coverage are as a result of the uneven distribution of fire stations within in the FCC. This can attributed to the lack of a scientific approach in the choice of locations for the sitting of these fire stations.

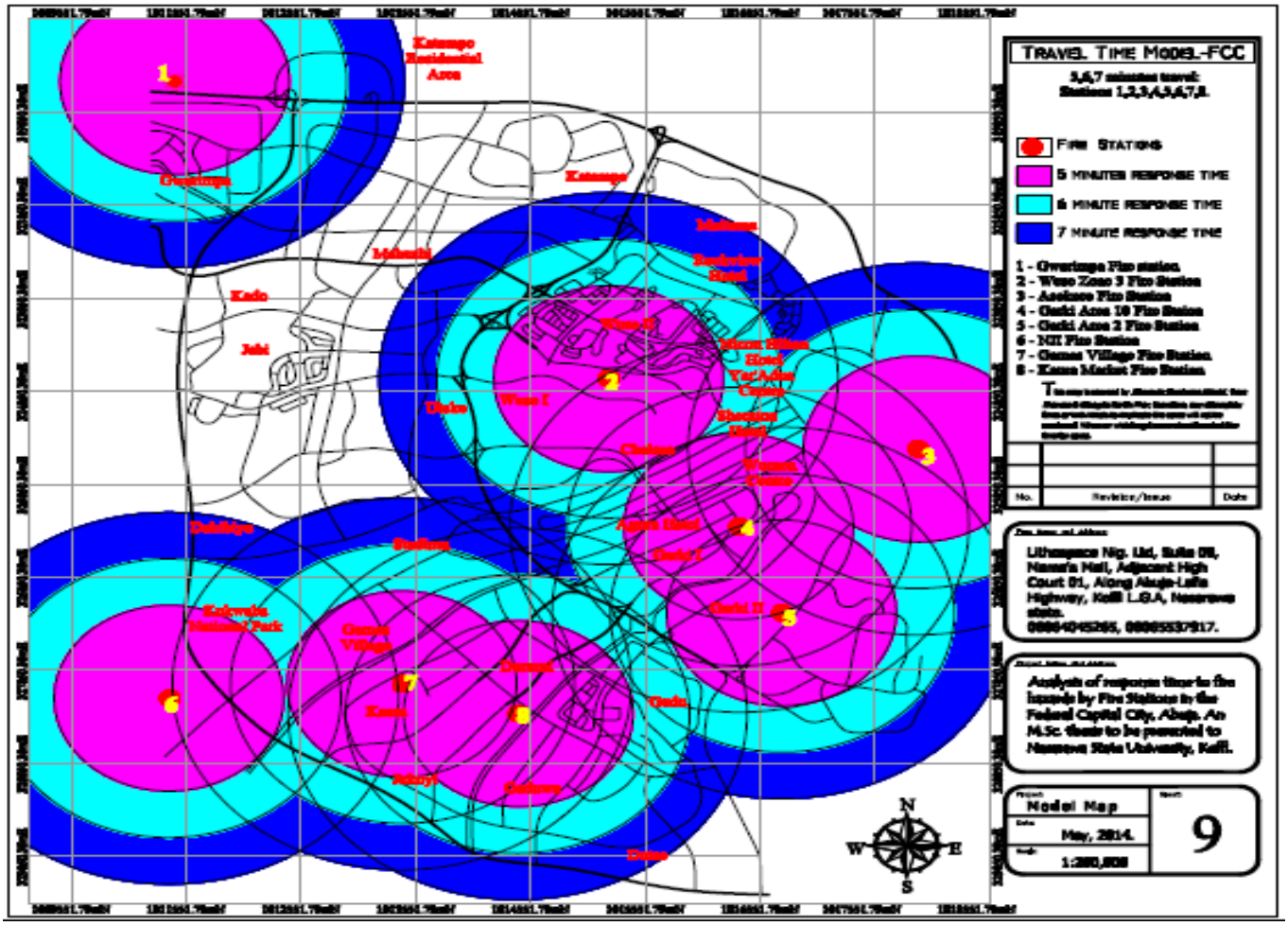

Figure 4: Spatial Distribution of Fire Station in the FCC

ISSN 2348 – 7968

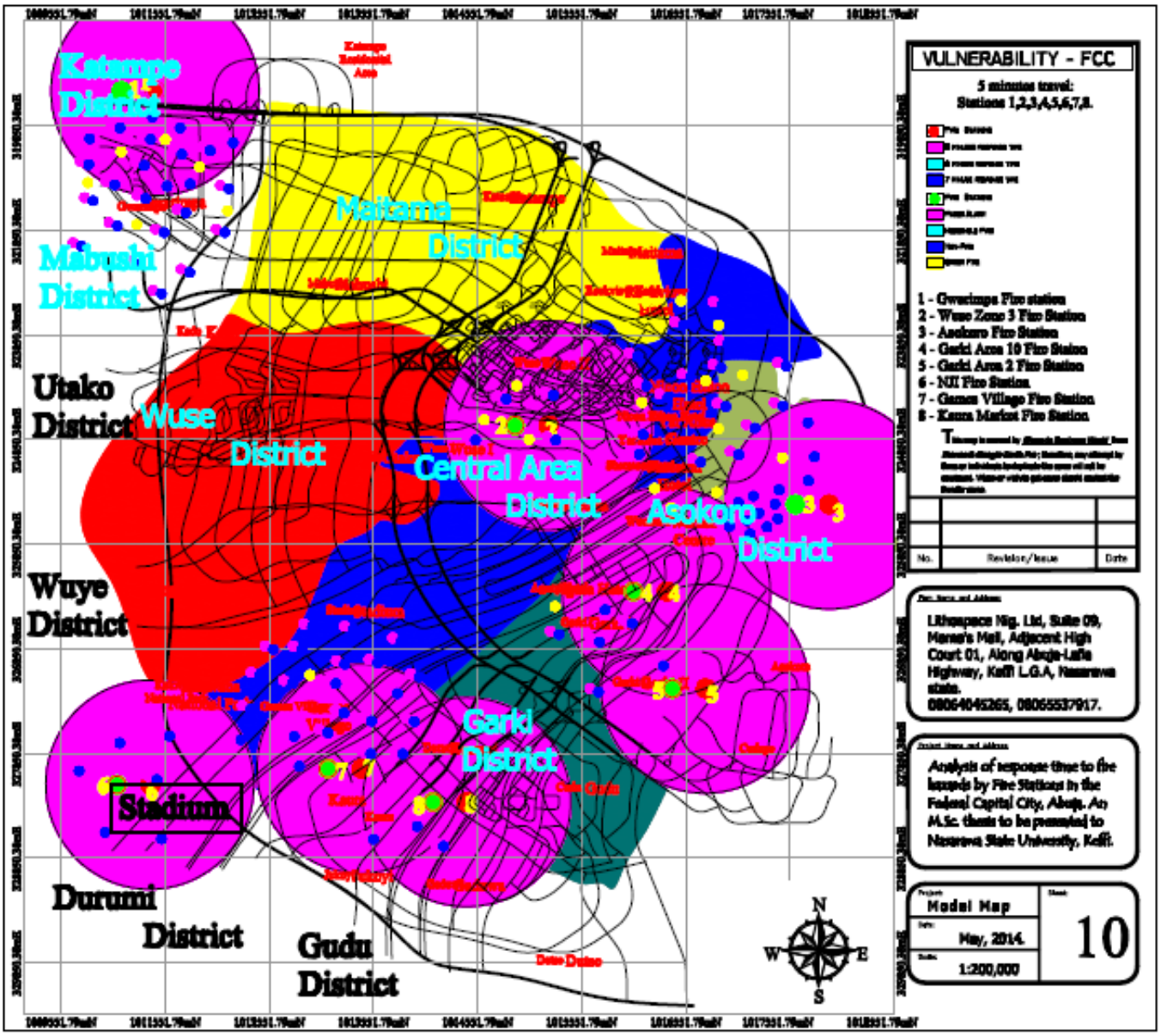

Figure 5: Fire Vulnerability map of the FCC, Abuja
Source: Author

Figure 5 shows the level of vulnerability of the various districts in the FCC to fire disaster, this map was constructed using 5 minutes travel time from each of the fire stations located in and around the Federal Capital City. From the map it can clearly seen that two districts, namely Maitama and Wuse districts are poorly covered within 5 minutes response time, thus most vulnerable to fire hazard. On the other hand Asokoro district has the best coverage, followed by Garki district. A review of the map clearly shows that Asokoro district is the least vulnerable to fire hazard.

ISSN 2348 – 7968

5. Conclusion and Recommendations

This study examined the spatial distribution of fire stations in the FCC. The study revealed that the Federal Capital City, Abuja is currently served by 8 fire stations located in and around the Capital City. An analysis of the fire vulnerability map shows that these fire stations are not evenly distributed among the five districts. Furthermore, these fire stations are grossly inadequate to serve the ever expanding Capital City with its rapidly growing population. Analysis of the fire vulnerability map revealed that Wuse and Maitama districts are poorly covered, hence most vulnerable to fire hazard, while Asokoro district has the best coverage, thus the least vulnerable to fire hazard. In light of the above the following are recommended: The FCT Fire Service should adopt a scientific approach such as the use of location- allocation models in determining the appropriate location for fire stations within the capital city. At least 2 additional fire stations each should be sited in Wuse and Maitama Distrcts and an additional Fire Station in the Central Area District.

References

Abuja Metropolitan Management Council (2012). Urban Affairs Department, Fire Service Division, *2012 Annual Report*

Adekayi, P.E., (2000). *Climate*. (P.D. Dawam,Ed) *Geography of Abuja, Federal Capital Territory*.Abuja, Famous/Asanlu Publishers.

Balogun, O.,(2001*). The Federal Capital Territory of Nigeria: A Geography of its Development*. University press Ibadan

ESRI (2007). GIS for Fire Station Locations and Response Protocol. *An ESRI White Paper*. January 2007

Federal Capital Territory Administration. (2013) *Facts about FCT*. Available online at www.fcta.org.ng

HFA, (2005). *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disaster*. UNISDR, Nairobi. Available online at www.unisdr.org/eng/hfa/docs

Mabogunje, A.L (1976). *Report of the Survey of the Federal Capital Territory*. Pp. 1

Mirchandani, P. & Reilly, J. (1987). Spatial Distribution Design for Fire Fighting Units. *In Ghosh, A. & Rushton, G. Spatial Analysis and location-Allocation Models. New York: Van Nostrand Reinhold Company Inc.*

Mshelgaru, I H (2012) An evaluation of disaster safety performance of the high-rise-buildings in Abuja *In: Laryea, S., Agyepong, S.A., Leiringer, R. and Hughes, W. (Eds) Procs 4th West Africa Built Environment Research (WABER) Conference, 24-26 July 2012, Abuja, Nigeria, 901-911. 9*

Murray, A. & Tong, D. (2009). GIS and Spatial analysis in the media. *Applied Geography,* 29: 250-259.

National Emergency Management Agency (2012). *National Capacity Assessment Report.* Pp. 40. Available online at www.nema.org.ng. Accessed 23rd January, 2013

National Fire Protection Association. Codes and standards. Available online at www.nfpa.org/codes-and-standards

Punch Newspapers, December 4, 2012. *Preventing Incessant Fire Outbreaks*. Editorial Comment P. 18

Schilling, D.; Revelle, C.; Cohon, J.; & Elzinga, J.(1980). Some models for fire protection locational decisions. *European journal of operation Research* 5: 17.

The Nation Newspapers, January, 22, 2013. *Stemming the Tide of Fire Disasters*. Available online at www.thenationonlineng.net. Accessed January 22, 2012.

United Nations International Strategy for Disaster Reduction (2004). *Living with Risk. A Global Review of Disaster Reduction Initiatives*. Geneva. UN Publications

Vanguard Newspapers, August 8, 2012. *Three Killed as Building Collapse in Abuja*. Available online at www.vanguardngr.com. Accessed 5th December, 2012.

Vogel, C and O'Brien, K (2004). Vulnerability and Global Environmental Change: Rhoteric and Reality. *Aviso-information Bulletin on Global Environmental Change and Human Security 13*. Available online at www.grechs.org/publications

Villagran De Leon, J,C (2006). Towards the Design of the Indonesian Early Warning System. *Draft Document. United Nations University, Bonn Germany*.