

# “An Investigation into Fire Safety Measures in Kampala Slums.” A Case of Katanga-Wandegeya

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## Abstract

Globally, UN-HABITAT estimates that nearly one billion people live in slums in the cities/towns of developing countries and the annual growth rate in sub-Saharan Africa is almost 5 percent, twice as high as in Latin America and Asia representing a total of 187 million people. Slums have a very significant contribution towards providing cheap shelter for the urban poor in Uganda's capital Kampala. Statistics from Uganda Bureau of Statistics (UBOS) indicate that Uganda has a population of 38 million (2014) with Over 60% of Kampala's population living in slums. In the last decade, however the problem of fire hazards in Kampala slums has become quite overwhelming for the City authorities. This research therefore sought to investigate the existing fire safety measures used in slums with the objective of finding ways in which fire safety can be enhanced in slum dwellings. This research revealed that the one roomed house type was most dominant which is inhabited by 3-5 people. 94% of the respondents used charcoal for cooking inside or on the verandahs of such houses. In addition to that, most causes of fires in the slums were due to electric faults due to illegal connections, with exposed wiring. This work recommends that considering the spread of fire, structures should be designed and given minimum space allowance of about 1m so as to limit spread of fire from the original source to the neighborhood structures. Fire brigade should involve the use motorized bikes such as back pack bikes installed with all firefighting equipment which can access the remote areas in slums where fire engines may not reach.

**Keywords:** Fire safety, slums, fire hazards, Uganda

## Introduction

Globally, it is estimated by the UN-HABITAT that nearly one billion people live in slums in the cities/towns of developing countries of the world and the annual growth rate in sub-Saharan Africa is almost 5 percent, twice as high as in Latin America and Asia representing a total of 187 million people. UN statistics indicate that by 2020, more than 1.5 billion people will live in slums. Kampala city has 62 slum settlements spread in its five divisions. Three of its divisions i.e. Rubaga; 16 settlements (230,000 families) Nakawa; 16 settlements (67,000 families) and Kawempe; 16 settlements (59,000 families) have the largest slum population followed by central division with 7 settlements (9,076 families) and then Nakawa with 6 settlements (67,000 families). (Skye Dobson, 2014). Slums have a very significant contribution towards providing cheap shelter for the urban poor in Kampala and considering the period they have existed it is clear that they are with us to stay. In Katanga slum, land tenure is complex, people maximize their plots without giving due consideration for building setbacks. This implies that services such as roads are inadequate and in the event of a fire outbreak service trucks are denied access thus costing lots of properties and lives. (UNDP, 2008). Statistics from the Directorate of Fire Prevention and Rescue services at fire brigade Kampala from the month of April to June 2017 revealed that central division had the highest total of 19 fire outbreaks, followed by Makindye with 16 fire outbreaks, then Nakawa and Rubaga had 12 fire outbreaks and then Kawempe had 11 fire outbreaks. (Hassan.K, 2017)

## Objectives

The primary goal of this paper is to investigate the fire safety measures used in slum dwellings of Katanga-Wandegeya slum. The other objectives included; studying fire safety strategies, to understand how spatial use of spaces in slums contributes to deficiency in fire safety, propose ways in which slums can be made safe from fire hazards.

## Methodology

The researcher used already documented literature review and statistics from fire brigade Uganda, Newspaper articles, Journals and books about fire safety; used photography so as to have a record of the situation under study; site visits to ascertain the situation on site, took measurements of spaces so as to have a thorough study of the subject of interest and questionnaires plus focused interviews with the slum dwellers, local council authorities and fire brigade department officials.

## Literature review

UN-Habitat (2003) defines it as, “a contiguous settlement where the inhabitants are characterized as having inadequate housing and basic services. A slum is often not recognized and addressed by the public authorities as

an integral or equal part of the city.” Similarly, Watson (2009) describes slums in terms of their spatial location and form as peripheral areas which are, “almost entirely un serviced and unregulated” and, “are impossibly costly to plan and service in the conventional way, given the form of settlement, and even if that capacity did exist, few could afford to pay for such services.

In order to thoroughly investigate fire safety in slums ,it was essential to understand the house types, number of rooms and house this affects their spatial use. Nnaggenda, 2004 In her PhD research identified eight house types which she categorized and named as follows: Type 1 - one roomed types, Type 2 - the two roomed type, Type 3 - the square four roomed type, Type 4 - single strip house types, Type 5 - the double strip type, Type 6 - mixed residential-commercial types, Type 7 - the deep strip types, and Type 8 - the Other types in the informal settlements. In her study she describes *outdoor space* as a basic functional space just like the indoor space although it is most considered as a left over space when housing designs are made. This space accommodates a variety of activities that take place outside the house which include; cooking space for women, nurturing children, washing clothes, entertaining guests, bathing, socializing in good weather, and storage of property during the day and as a place for children to play. Outdoor space in slums acts as a place for income generating activities which are executed by women in a home as they attend to their daily activities.

Indoor space on the other hand uses in most designs is adjusted to suit the user’s needs. Sydie, 1996 defines space as the physical boundless area available within the home and the intermediate environment. Internal space usually has multiple uses and Rappaport emphasizes how multiple use of space greatly affects the form of the house and settlement, he emphasizes that since a house is a little differentiated internally most activities take place in it or in its intermediate setting and therefore the cause to study the different spaces to provide adequate spaces for the dwelling occupants. Internal space can act as a sitting room in the morning, a reception in case of visitors, a sleeping space at night and a storage place for personal property.

Fire by its nature, accelerates combustion of materials and its therefore essential to understand the material types so as to draw an understanding of how they contribute towards supporting a fire. Materials in slums range from the use of the indigenous building materials such as bamboo, laterite, timber, stones, and rammed earth to the use of modern materials such as burnt bricks, concrete blocks, glass and cement. These may vary as they are categorized into materials for roof, floor and then walls. The roofs of dwellings in slums are made of zinc, iron sheets, timber tiles, slates, corrugated iron, asbestos cement sheets, veneer, plywood, artificial wood of synthetic material and polyvinyl chloride (PVC) material which is a great transformation from the use of grass. (Lengyel, 1978).

### **Common causes of fires in slums**

The research revealed that cooking is the leading cause of slum fires and slum fire injuries. This has been attributed to unattended cooking and the injuries occur when people try to fight the fire themselves and also the way they use space for cooking at the same time storage of kerosene, gas cylinders contributes to the easy ignition and spread of fires in these settlements.

Arson has also been suspected to be a cause of fire in the slums. It is attributed to politics, evictions and theft. Land-owners use fires as a form of eviction strategies whereby settlements are set ablaze so as to render the people homeless and have them move out of the area. In some scenarios, thieves initiate fires so as to rob other homes as individuals evacuate their homes. Candles fires are caused when a candle is left unattended too and it burns to completion. More of the fires caused by candles begin from the bedroom and others are started due to presence of combustible materials that can burn such as furniture, mattresses or bedding, curtains or decorations put too close to the candle.

Electrical distribution or lighting equipment such as fixed wiring, meters, switches, receptacles, outlets, cords and plugs and lighting equipment which can easily start a fire due to their poor maintenance, overloading and others with dysfunctional fusing elements. Lightening fires and strikes are caused by lack of lightening arresters on structures in slums and in the event of a heavy rain a fire can be ignited if lightning strikes.

According to (Koome, 2016), Electrical defects have been identified as the main cause of fire outbreaks in kibera informal settlement in Kenya and this is due to illegal connections and overloading of the electric supply as residents use power for cooking which may burst the power lines and later cause a fire outbreak. In other cases connections are done underground which increases the risk of fire outbreaks during rainy season as naked wires once in contact with running water can lead to electrical shock.

Domestic violence is also to blame for the fires in the slums. Occasionally during such incidences, couples result in using items such as stoves, which explode in the process, ignite nearby combustible material within the houses and causing damage to property including injuring other persons. Cooking equipment was also identified as one of the causes of fire outbreaks in slums as residents use open flames such as firewood to prepare their food while others use paraffin stove. Cooking while under the influence of alcohol is one of the reasons why the cooking stove can lead to a fire as people fall asleep leaving them unattended.

Cigarette smoking is another cause of fires in slums due to moral lapse as parents are so busy to attend to

the youth who due to peer pressure have been victims of the habit and after using these cigarette filters they happen to throw them anywhere which can easily start a fire.

Fire protection design ensures that building occupants are provided with an environment safe from fire and products of combustion. Fire protection design aims at mainly three principles; the detection of fire; the suppression of fire and the facilitation of escape in case it occurs. The ability to fight the fire depends on access to sufficient water, and access routes for fire-fighting equipment and vehicles. Fire engines in slums cannot access the area because of the poor road structure and the congestion of buildings in these areas with barely less than 0.5m between each other and this slows or completely prevents emergency services taking firefighting equipment from reaching closer to a fire there by increasing the time it takes to begin firefighting and reducing the effectiveness of their firefighting capacity.

According to (Raphela, 2011), the difficulty of fire vehicles to access the houses in slums is one of the reasons why during a fire incidence many of the affected lose their entire belongings. In addition to that, the impact of response time by the fire engine escalates a fire and this is backed up by (57%) of the respondents who reported that it took more than ten minutes for a fire engine to arrive at the scene. Fire services are faced with the difficulty of sourcing reliable and sufficient *quantities of water* in order to easily fight off the fire and this diminishes the capacity of fire services to fire fight effectively which allows the fire to spread quickly and easily between buildings. (Ono, 1997).

Interventions aimed at reducing fire threat should focus at introducing cheap and affordable measures for the local slum dwellers. These measures can be achieved through using community initiatives for example a case of Mukuru Fuata Nyayo in Kenya, they used community fire response mechanisms where by upon the outbreak of a fire, the residents played different roles to contain the situation. Some were mobilized to rescue people, raise alarm, and create firebreaks while others were tasked with maintaining security, order and putting out the fire.

The MANTAG guidelines are South Africa guidelines developed in 1993 to establish a degree of fire safety in informal settlements. These were developed in response to the realization that fire was a devastating disaster to already impoverished communities within informal settlements in the country. (CSIR, 2000)

Some of these guidelines include: Creating awareness of fire safety during trade-off debates during stakeholder participation process through providing education regarding fire safety in the use of open flames for cooking and lighting, promoting the choice of electricity within limits of affordability, introducing the concept of watch towers for early warning which could be operated by the community; ensuring that there are fire breaks between groups of units, which correspond to hard or soft open spaces and the space should be dependent on local weather and topography. For instance, in windswept flat areas more space is required and open spaces should be downwind of the prevailing wind direction; providing escape and access for firefighting equipment since heavy firefighting tankers can only move along paved surfaces and smaller terrain vehicles can negotiate unpaved surfaces. This guideline also outlines the minimum distances for fire hydrants in areas where they are not provided and it considers that each building should be within 30m of a gravel road or 90m of a paved road linked to the road network; ensuring adequate space between individual buildings as illustrated below to reduce the spread of fire which focuses at the stand size, coverage and housing type which should take into consideration the minimum safety distance guidelines.

There is usually no designated space meant to serve as outdoor spatial use, but only that created when buildings are built side by side forming alleys in the range of 900-1200mm wide which is entirely public and serves as circulation space and cooking spaces for those that have aprons on their dwellings. In these areas there is no privacy so others tend build temporal structures around their aprons to define their space and this serves as the woman's kitchen space and storage for charcoal and raw food products.

The interior space for the one roomed house is flexible, with the lounge flowing into the bedroom but separated by a curtain to define some privacy within the sleeping and visitors space. The arrangement of furniture is not permanent since the functions of the room change during the day and night. The dwelling is usually accessed through one main door which leads into the living room and the indoor cooking space usually behind the doorway on the extreme end of the dwelling.

From an analysis of reports from fire brigade it was recorded that 40% of the fires extinguished had no established causes. However for those that had a clear cause, electric short-circuits at 16% dominated, followed by charcoal stove, candle, matchbox, cigar at 15%, then fires caused due to Arson contributed 12% and others like overheating 3%, gas cylinder 1%, sparks 3%, failed brakes 3%, welding 1%, uncontrolled burning 2%, negligence 3%, and electric appliance unattended 1% Therefore from the analysis of studies conducted in Katanga slum and fire brigade reports, it's clear that fire outbreaks are majorly caused by electric short-circuits followed by candle wax, charcoal stoves which validate the credibility of this research.

## Conclusion

Considering the spread of fire design, Structures should be designed and given minimum space allowance of about 1m so as to limit spread of fire from the original source to the neighborhood structures. These criteria will

focus at the standard house size, coverage and housing type. Spread of fire design should seek to address the issue of illegal electricity connections, encourage the concerned authority to provide standardized tariffs affordable to people staying in slums and ensure that electric wires are run through conduits so as to minimize their connections along iron sheets and on walls.

A study on activities carried out in the area indicated that people usually work from spaces where they can interact and still have privacy when conducting their duties and therefore creation of communal cooking spaces to ensure that the cooking activity is highly socialized and monitored can help minimize fire hazards that may destroy people's homes. These spaces should be built with highly fire resistant materials for example concrete blocks to minimize spread of fire and smoke to the neighboring structures.

Fire compartmentalization, this involves using fire resistive enclosures at specific areas demarcated for cooking and this will help to limit fire and smoke spread, allow for longer escape time and reduction of the maximum potential size of the fire. Materials such as concrete blocks can be used to build this partition since it's highly non-combustible and therefore fire can be contained.

Since some fires are caused by children while playing with ignition sources like match boxes introducing sand pits in the area where children play during the day time and sensitizing them about the use of sand such that in case of a fire outbreak in the area, it becomes a collaborative effort since everyone will know where to find what material for firefighting. In addition to that fire sand buckets should be installed in homes hang at specific points so that it's not consumed for other purposes.

Fire brigade should introduce rapid interventions which involve the use motorized bikes such as back pack bikes installed with all firefighting equipment and can access the remote areas where fire engines may not reach. In addition to that they can use the rapid intervention trucks (customized pick up size) which are equipped too. These strategies help minimize on the response time of emergency services.

Fire brigade should train community volunteers and provide them with the necessary firefighting equipment such as portable fire extinguishers and this will help them respond quickly in case a fire is reported in the area and also they will act as watch dogs to ensure that people respond to the sensitization strategies conducted in their areas such as fire safety in the use of open flames for cooking and lighting

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