THE IMPACT OF SHACK FIRES ON THE PEOPLE OF J.B MAFORA INFORMAL SETTLEMENT, BLOEMFONTEIN, SOUTH AFRICA

By

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DECLARATION

By submitting this dissertation, I declare that the entirety of the work contained therein is my own, original work and that I have not previously in its entirety submitted it for obtaining any other qualification. I declare that all sources used or quoted, have been indicated and acknowledged by means of complete references, and that this dissertation was not submitted by any other person at any other university for a degree.

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ABSTRACT

This study examined the issue of informal settlement fires in J.B. Mafora informal settlement of Bloemfontein in the Free State, a province of South Africa. The study aims to identify, address and understand the issues and the unique dynamics involved in this type of fires at the study area. The study also illuminates the main contextual factors that contribute to the perpetuation of J.B Mafora informal settlement fires that relates to the risk and vulnerability of the people of J.B Mafora. A qualitative research approach is followed and a triangulation of data collection methods is used, combined with a relatively broad literature study to capture the complexity of the related issues. The contextual focus includes the macro-economic factors that contribute to the environment in which informal settlement fires occur; developmental, economic, political and social aspects and the related experience of poverty, urbanization and unemployment. Furthermore, the study attempts to show that a relationship exists between disaster management and poorer communities.

Key findings suggest that local government in the demarcated study area has great influence on how the problem of informal settlement fires is addressed from national to local municipality level. This further relates to the view taken in the thesis that informal settlement fires are a social issue and not only an operational issue. Therefore the broad social, economic and political context and history are included; it also shows that the problem of informal settlement fires is part of a greater developmental context and related processes. A variety of vulnerability theories were chosen as a useful framework for analysis in this study and to approach issues of risk and vulnerability on a community level.

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LIST OF ACRONYMS

DMAs	Disaster Management Authorities
DWAFF	Department Of Water Affairs Forestry and Fishery
DVRA	Durban Village Residents Association
IA	Impact Assessment
IDP	Integrated Development Plan
NGOs	Non Governmental Organisations
PAR	Pressure and Release
UNCHS	United Nations Community Health Safety
UNDP	United Nations Development Programme
UNDHA	United Nations Department Humanitarian Affairs
NGO	Non Governmental Organisation
VA	Vulnerability Assessment
WoF	Working on Fire

CHAPTER ONE

RESEARCH ORIENTATION

1. Introduction

The weather and climate of the Free State province were proven by the South African weather services to be problematic and harsh; with Bethlehem one of the town in the Free State crowned the coldest city in the whole of South Africa. The weather reports show that an early frost occurs frequently in most Free State cities such as Bethlehem, Bloemfontein and the mountainous QwaQwa. The cold temperature encourages the use of open fires in most Free State settlements. The study found open fires to be the main source of heating in most informal settlements of the capital city. Secondary data from the Mangaung fire department link loss of human lives and livelihoods in general as direct effects of the use of open fires for heating Mangaung fire department reports (2009).

The fact that the South African government has called for de-electrification of shacks as a way of reducing shack fires in 1996 has affected the country negatively, and has seen the number of shack fires escalating countrywide post 1996. With electricity connections, the number of igniters will be reduced, for examples lights will be used instead of candles. The study is based on the many similar social and political issues like the above identified, and the fact that every winter the famous chilly weather of Bloemfontein forces informal dwellers to find a source of energy for heating in open fires leading to an escalating number of fires every year.

The South African government through its disaster management Act regards shack fires as a disaster, but disaster management authorities (DMAs), the local government in the country regards them as normality, probably because of its frequency in the country. The international strategy on disaster reduction (ISDR) of the United Nations (2002) describes disaster as a serious disruption of the functioning of the community or a society causing widespread human, material, economic or environmental losses which exceeds the ability of the affected community or society to cope using its own resources. The UNDRO/UNDP (1997:3), however, reports that

many deaths from exposure to a hazard in remote areas are known only to local villagers, and news does not reach the capital city unless someone is rescued and interviewed.

After each shack fire affected communities are given relief aid. However, the actual impact of the fire remains unknown as incomplete records are kept in most fire departments in South Africa. The toll on human lives and livelihood has never been fully calculated. The discrepancy between what is happening in the communities and the DMA's claims that shack fires are not a disaster is a problem; more especially when the United Nation's definition of disaster is considered. This inconsistency leads to the lack of disaster risk reduction measures also investigated in the study.

The occurrence of fires in informal settlements can be a major obstacle to development. It perpetuates poverty through the loss of personal and community assets and also strains government resources where recurring fires require continuous government spending on disaster management efforts, which could otherwise have been directed towards service delivery. The occurrence of informal settlement fires could be related to the distinct inequality in the South African society, including inequalities ranging from economic, social, political, class and structural inequalities, to inequality of opportunities. All these factors are related to poverty and deprivation. This in turn, is related to informal settlement sprawl and a potential increase of the risk of informal settlement fires occurring. Two main contributing factors to informal settlement sprawl in South Africa are poverty and urbanization. Wisner (2004) argues that the latter is part of a strategy of the rural poor searching for better opportunities, which is related to a person's economic status as a direct measure of poverty and a motivating factor in migration.

1.1 Motivation of the study

The study is first and foremost an academic study pursued in partial fulfilment of master's degree in Disaster Management. The other motivations have been triggered by the frequent and continued dominating reports by news media of fire disasters in informal settlements throughout South Africa. In South Africa massive shack fires spread effortlessly through the tightly spaced shacks and its destruction is without a doubt a severe stressor. According to Walsh (2003), such a crisis may disrupt the functioning of the community. This has triggered the researcher's interest

to find out what impact these fire disasters have on the people frequently affected. The researcher will explore their perceptions about these fires as a risk and the management of fire disasters internally within J.B. Mafora informal settlement and externally (e.g. Government and other organizations).

For sources of fuel residents of J.B. Mafora informal settlement engage in dangerous, unreliable and unsustainable practices like use of paraffin for cooking and heating, and candles for lights amongst other things. Statistics South Africa (Stats S.A), (2001). The proposed study is also justified by the information gap on vulnerability of the people of J.B. Mafora pertaining to shack fires. There is also a need to assess the impact of shack fires holistically in this community in order to reduce the level of risk and to minimize the effects of disaster to this community. By providing more information on the potential hazards it is possible to chart out more effective disaster prevention and preparedness measures.

Losses and damage among the residents of informal settlements make it urgent to study and understand the risk accumulation processes in this community, and to identify how locally initiated processes can address these risks. There is also a need to understand what local changes can reduce these risks, particularly through actions that might be undertaken by central government, local government authorities, community organizations, development and disaster-oriented Non Governmental Organizations (NGOs) and most importantly by the community itself.

1.2 The problem statement

Man-made fires are both an environmental and social problem with roots in societal factors that influence the context in which these fires occur and the manner with which they are dealt with. An informal settlement fire risk is not mainly a structural problem related to the nature of the structures, but is also affected by non-structural risks that drive vulnerability in informal settlements. Worldwide informal settlements are often seen as a problem which needs to be eradicated. Little attention is given to the problems facing informal settlement dwellers. The impact of informal settlement fires and other hazards to which informal settlement dwellers are exposed unfold against the background of the slow motion disaster of poverty and homelessness

Napier & Rubin (2002). Therefore it is important to give attention to the intrinsic social problems associated with a disaster such as informal settlement fires.

Shack fires that occur every winter at informal settlements in South Africa are seen and perceived as a natural and normal phenomenon by the authorities, and the communities are expected to carry on normally with their lives as if there has been no disruption. Needless to say shack fires are a widespread problem that is found throughout South Africa. Encyclopaedia of Disaster Management (2007: IV) says that natural disasters are increasing in severity and destruction in communities, especially shack fires. Typically, the poor are the worst hit for they have fewer resources to cope and rebuild. The South Africa Disaster Management Act (SADMA) stipulates what disasters are and the criteria for determining what makes any hazard a disaster. It is just the disaster management authorities who are stalling in response.

The people in the communal area of J.B. Mafora have been suffering immense losses due to shack fires every year for about seven years, Mangaung fire department reports (2009), yet there is no demonstrable capacity by the same people to respond to these fires by using their available resources. Every year reports from the fire department reveal, especially during winter months, most of the families in the J.B. Mafora community are affected by shack fires. The impact of these fires has not been well documented if studied at all. The study aimed at finding out the impact of shack fires on livelihood strategies socially. Key variables under social impacts such as economical, cultural, socio-political and psychosocial effects were examined.

1.3 Research objectives

The main objective of this study was to assess the social impacts (socio-political, socio-economic, psychosocial and environmental) of shack fires on the people of J.B. Mafora.

The specific objectives were:

- To investigate how these fire disasters are managed by the community themselves-internally (J.B. Mafora community) and externally (by the Government),
- To investigate long-term strategies of risk reduction that will bring sustainable solutions and incorporate disaster resilience and mitigation into actions and decisions.

- To examine the risk perceptions of the people of J.B. Mafora in regard to fires.
- To determine the level of vulnerability and capacity to cope with fire-related disaster risks among the people of J.B. Mafora.

1.4 Research design

According to research, design is the strategy adopted to approach a research problem.Leedy & Armod, 2001 McNeil (1990). Pretorius (2001) concurs by saying that design provides the overall structure for the procedure that the researcher follows, the data collected and analyzed by the researcher. The design is a plan outlining how information is to be gathered for an assessment or evaluation that includes identifying the data gathering methods, the instrument to be used, how the instruments will be administered, and how the information will be organized and analyzed. This study comprised of both quantitative and qualitative research.

Quantitative research follows an inductive research process and involves the collection and the analysis of quantitative data to identify statistical relations of variables. In qualitative research, research methods focus on gathering non-numeric information using focus groups, interviews and document analysis.Leedy & Armod (2001). Studies carried out by Russek and Weinberg (1993) claims that by using both qualitative and quantitative data, the study of science gives insight that neither type of analysis could provide alone. This was an empirical study that used both primary and secondary sources for data collection. Primary data was gathered through a variety of methods such as in depth and semi structured interviews, questionnaires and observations. Direct contact with previously affected households was made and direct impact was found as opposed to speculations. Eighty-six questionnaires were administered.

Bailey (1978) defines pure research as the development and testing of theories and hypotheses that are intellectually interesting to the researcher, but has no application to social problems at the present time. He defines applied research, as research with findings that can be applied to solve social problems of immediate concern. Pure and applied researches are not necessarily mutually exclusive. The ultimate goal of a study can be that it is helpful in solving social problems, and at the same time makes a valuable contribution to the theoretical social-science

literature. Bailey (1978) this study qualifies for both applied and pure research requirements. The research illustrates both the applied issues related to disaster management and related change, and in turn relates to theory to show that theory and practice of disaster management in communities intersect. Furthermore, informal settlement fires as a research subject has mainly been studied as a structural issue or as a quantifiable social problem relating to the statistical scope of informal settlements or the cause and scope in relations to the living conditions in informal settlements.

Babbie and Mouton (2004:270) concur by saying qualitative approach to social research takes the inside perspective on social action as point of departure. For this reason qualitative research is not stringent when it comes to data collection, it is focused on the reflexive relationship between social theory and methods, which Marvasti (2003:11) also calls a give and take relationship. Not only does the study aim to explore the impact of informal settlement fires in J.B. Mafora, it also aims to examine the problem from a relatively new perspective that includes Disaster management and the role-players involved in addressing the problem. This study is explorative as it deals with identifying and understanding the way in which the problem is addressed and the way in which the role-players are linked. The questions are not based on prior knowledge or assumptions, but rather on the notion that informal settlement fires can be seen as a problem with social elements and worthy of social study. The purpose of the primary research focused on exploring and gaining an understanding of the impact of informal settlement fires and the dynamics involved in addressing these impacts.

1.5 Research methodology

Research methodology is seen by Miller (1979) as the planned sequence of the process involved in conducting research, given enormous variability in their different paradigms, operations and the interaction that takes place. It specifies how the study addresses specific critical issues of representation and legitimization. Stenbacka (2001) has it that the methodology places the researcher in the empirical world and connects them to specific sites, persons, groups, institutions, physical places and bodies of relevant interpretive materials including documents and archives, it also seeks to address general planning of the research process, strategies and data collection techniques. Data collection for this study consisted of primary data in a form of

questionnaires, secondary data sources, interviews and observation. Babbie and Mouton (2004:80) propose a model by Selltiz *et al.* (1965) that focus on three methods by means of which exploratory research can be conducted, firstly a review of the related social science and other pertinent literature which this study has followed.

1.6 Eligibility and reliability

The study tried to involve as many people as possible to get as many views as possible about this case. The concept of validity and reliability are described by a wide range of terms in qualitative and quantitative studies. In this study multiple sources of data were used to maximize the validity and reliability. These sources enabled the researcher to secure an in-depth understanding of views from different sources used. Paton (2003:113) advocates the use of triangulation by stating that triangulation strengthens a study by combining methods. This implies several kinds of methods or data including using both qualitative and quantitative approaches.

In this study multiple methods for data collection were engaged into such as questionnaires, observations and interviews which led to more valuable and reliable diverse construction of genialities. Furthermore reports from the Mangaung fire department were looked into, to guide the researcher about the history of shack fires in the J.B. Mafora community. It should, however, be noted that triangulation includes multiple methods of data collection and data analysis but does not suggest a fixed method for all the researches. The method chosen in triangulation to test for the validity and reliability, the researcher made an effort to visit different sites for information, newspapers, news bulletins, emergency medical services reports and Mangaung fire department archives in the operational area.

1.7 Ethical issues

Ethical issues are based on the ethical notion that researchers have the right to collect data through interviewing people, but not at the expense of the interviewee's right to privacy Babbie & Mouton (2004:520). Therefore in the analysis of the data collected the interviewees were referred to as respondents, participants or by gender where there was a need to ensure anonymity for ethical considerations. A confidentiality statement was read out to the respondents by the researcher and the research assistants before the interviews took place. Although some respondents' positions and names were known to the research assistants, it was agreed not to

share their identity publicly. Permission to administer the questionnaires was sought from the ward councillor of the community. The respondents were not promised any benefits whatsoever in order to participate in the study. The participation was voluntarily. All material used in any form, and citations were acknowledged after the summary of the study in the form of Harvard referencing.

1.8 Description of the study area

South Africa is currently the richest African country economically in the SADC region, because of this, it is the recipient of many illegal immigrants, refugees, rebels and again because of abundance in tertiary institutions, most fellow Africans arrive in the country for study purposes. Because of the incompetency of the South Africa's home affairs department also known as horror affairs by Daily Sun news papers from (2002), following the 20 year-old boy who held the home affairs officials hostage because he had enough of their incompetency, the people who arrive in the country from other African countries find themselves settling in the country without work, study or even residential permits.

These factors and many others force these people to settle illegally in informal settlements, putting pressure on the already unavailable land already overpopulated by South Africans who settles informally to be next to the central business districts across the country (CBD) for easy access to services. Settlement choice renders these people and other locals vulnerable to shack fires. As a result of these conditions preparedness and mitigation strategies need to be put in place that specifically deals with shack fires. Settlement choice renders these people and other locals vulnerable to shack fires. As a result of these conditions, preparedness and mitigation strategies that specifically deal with shack fires need to be put in place.

1.8.1 The Free State province

According to census (2001) the Free State province is the third province in South Africa with the largest number of informal settlements. The province is characterized by high poverty rates, inequalities in the distribution of income between various population subgroups, and

unemployment Stats SA (2001). The population of the Free State province according to population census 2001, was 2, 706 755.

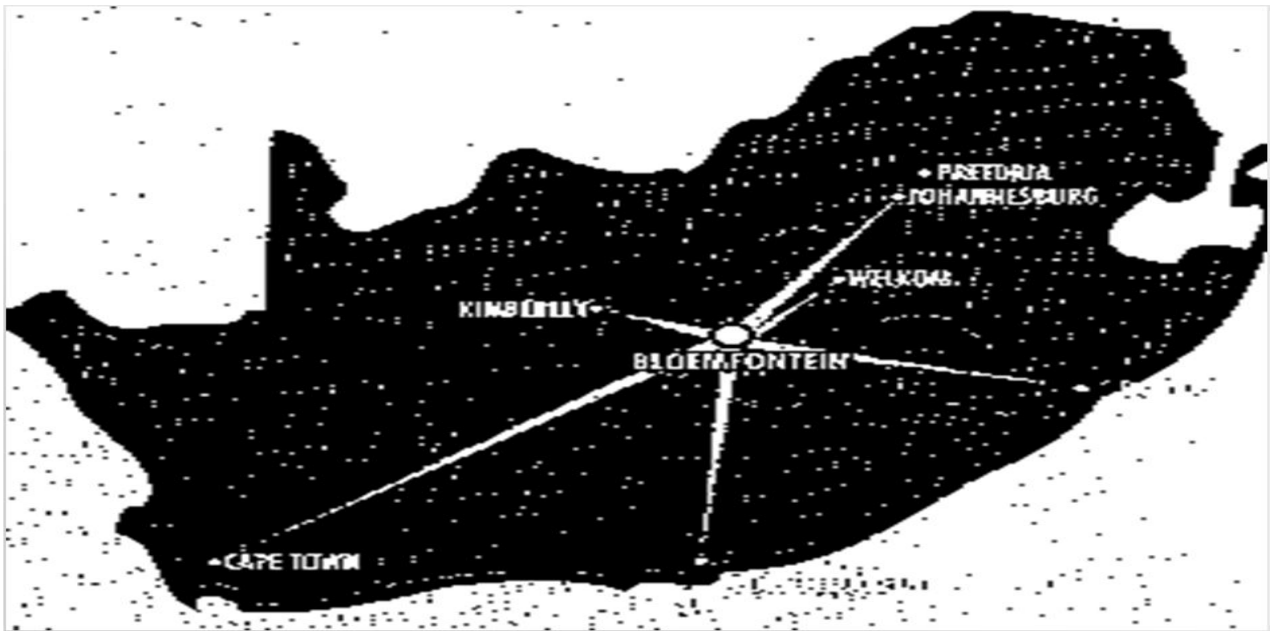
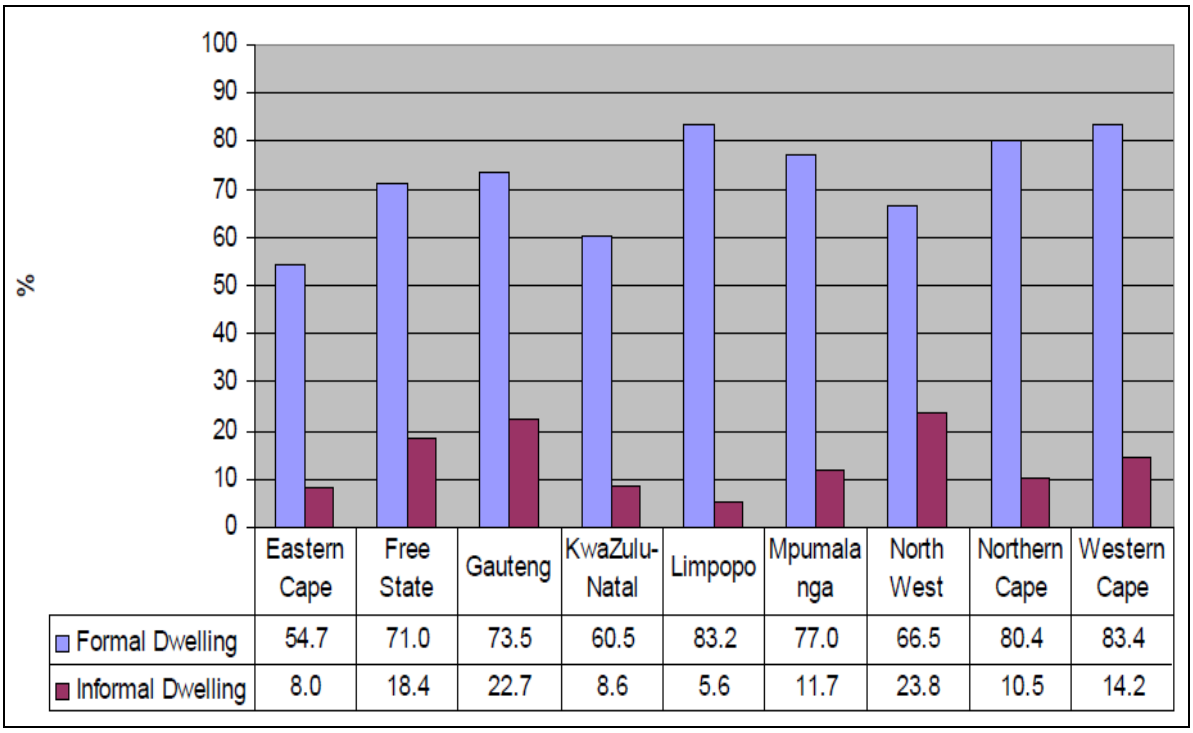


Figure 1.1: Shows geographical position of Bloemfontein (Mangaung city) on South Africa's cities map

The 2001 population census indicated that approximately (85%) of households in Mangaung city use electricity, (32.11%) used paraffin mostly for cooking and 9.32% used candles for lighting. The rest of the households used gas (0.3%), solar (0.1%) and other forms of energy (0.2%).Electricity in Mangaung is supplied by Centlec and Eskom. Centlec is the first municipal entity created in terms of the municipal structures Act. Bloemfontein city is the economic hub and the capital city of the province, and will remain the focus of the study. The city is centrally located in South Africa and is served by major roads such as the N1 which links Gauteng with the southern and western Cape, the N6 which links Bloemfontein to the Eastern Cape and the N8 which links Lesotho in the east with the northern Cape in the west via Bloemfontein.

The city has developed around the central business district (CBD) in a sectoral form, with the majority of the poor and previously disadvantaged communities living in the south-eastern

section. The north/south railway line creates a definite barrier between communities and has distanced the poor from the economic opportunities that are mainly concentrated to the west of the railway line. That is where the study area, J.B. Mafora informal settlement, is situated. Except for the industrial areas which flank these settlements, the previous disadvantaged areas offer very few job opportunities to these individuals and people need to travel up to 15 kilometres to get to the city centre.



	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape
Formal Dwelling	54.7	71.0	73.5	60.5	83.2	77.0	66.5	80.4	83.4
Informal Dwelling	8.0	18.4	22.7	8.6	5.6	11.7	23.8	10.5	14.2

Figure 1.2: Showing percentages of formal and informal dwellings of South Africa

1.8.2 The demarcated study area

The study is demarcated to J.B. Mafora informal settlement in Bloemfontein in the Free State Province of South Africa. To be able to study all the elements of the research questions in-depth, it was necessary to narrow down the area of study to a single informal settlement. Generally the unit of analyses refers to what is being studied, this can include an object, phenomenon and entity, process or event you are interested in investigating Babbie & Mouton, (2004:84). In this case the study investigates the impact of shack fires in J.B Mafora settlements other settlements

will be used for comparison purposes only. When the subject of study is based on real life as is the case, it is referred to as an empirical research problem Babbie & Mouton (2004:84). Therefore it is an empirical research study that included interviews and observation of real-life experiences and action.

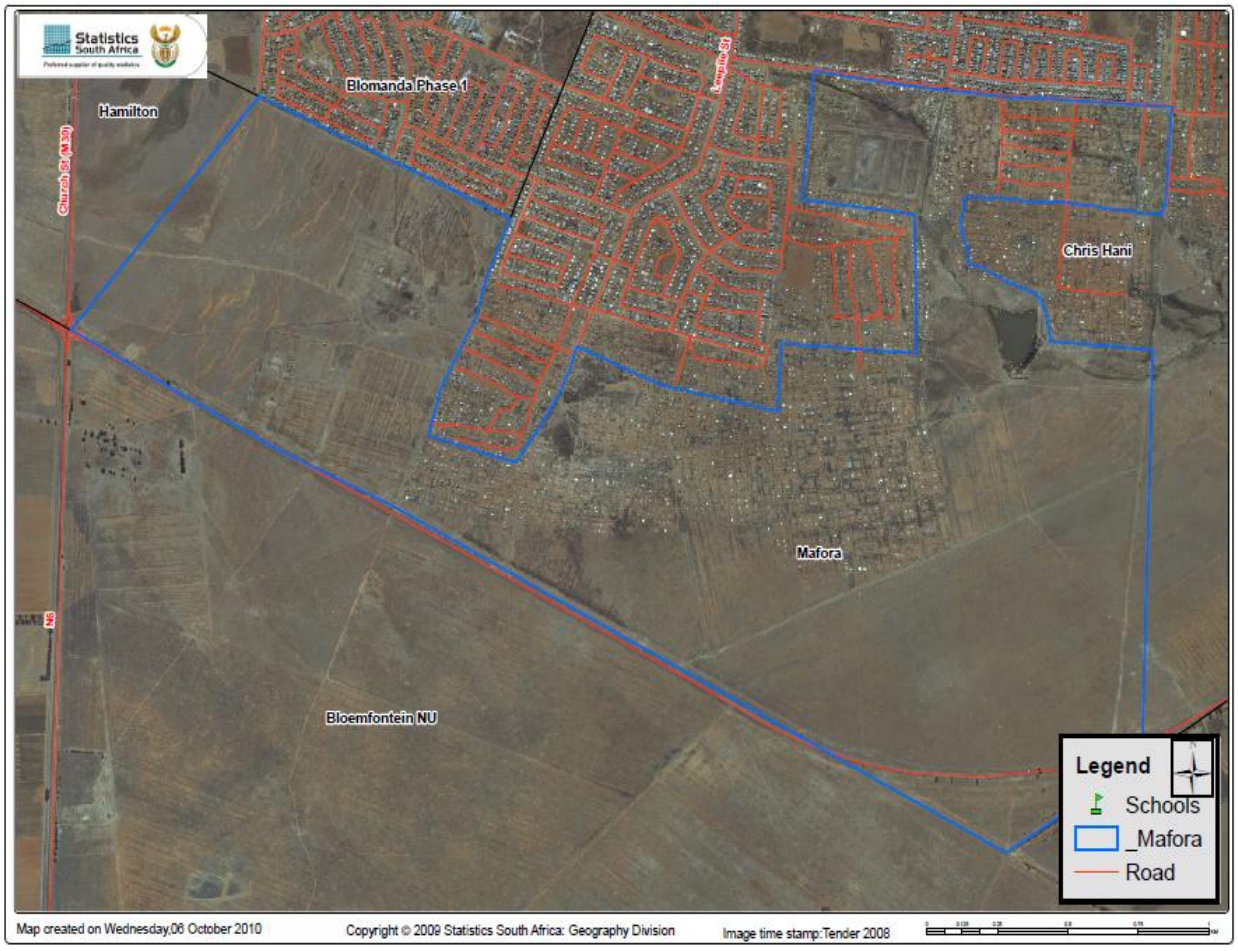


Figure 1.3: Aerial map of J.B Mafora informal settlement in the Free State province: Stats SA (06.10.2010)

J.B. Mafora is an informal settlement that lies on the outskirts of Rocklands, one of the Mangaung city locations, ten kilometres away from the central business district, founded as a result of Lesotho people migrating to South Africa after 1994. Census 2006 reported three shacks

for male labourers employed on the farms in the Bloemfontein areas. The area was largely unplanned and developed rapidly. While the population has grown, the physical area of J.B. Mafora has not expanded significantly, and all residents live on an area of just over three square kilometre Stats SA (2001).There are an estimated 2,781 informal dwellings in J.B. Mafora. This means that sixty-two percent of J.B. Mafora's population lives in informal dwellings. The J.B. Mafora population is 6,000 according to the latest statistics census. The J.B. Mafora settlement is one of the fast growing informal settlements within the city of Bloemfontein.

The employment status of this community was 941 employed individuals and 795 unemployed with no-one earning more than R13, 000 per month according to census recordings Stats SA, (2001). According to the Mangaung fire department this settlement experiences most household fires second to Botshabelo. The major causes of shack fires are candles, paraffin stoves and wood fires used by this community. Although most of the household fires are caused by candles in this community where 228 households were recorded as using candles in 2001, the majority of them are caused by paraffin as 536 households in this community use paraffin for heating and 534 households use it for cooking. There are few job opportunities, with the population of approximately 6,000 leaving the majority of the population living below the poverty line. Stats SA (2001).

Table 1.1: Population of J.B Mafora by their vulnerability status

EMPLOYMENT					
Place	**Not applicable**	**Employed**	**Unemployed**	**economically inactive**	**Total**
J.B Mafora	178	177	192	122	669
INCOME CATEGORY					
No income	468				
R 1 - R 400	66				
R 401 - R 800	59				
R 801 - R 1600	56				
R 1601 - R 3200	12				
R 3201 - R 6400	4				
R 6401 - R 12800	3				
R 13000 or more	-				
FUEL					
Electricity	7				
Gas	10				
Paraffin	536				
Wood	51				
Coal	41				

(Source: Stats SA (2001)

- **Structure**

  Almost all the housing structures in the area are sub-standard and do not comply with local building and planning codes. Most of the structures in the study area are temporary turned permanent shelters constructed from iron sheets or wood planks. Some of the worst are made from bamboo wood. An average of five family members lives in an average land size of 20-30 square metres.

- **Infrastructure and service**

The people of J.B. Mafora informal settlement are not recognized by public authorities as an integral part of the Mangaung municipality. A query made to the city administration, rural administration, police and the health authorities show that none of the above recognized the settlement as it existed except the Mangaung Statistics department. The researcher observed no road at all, and the narrow streets are like lines that divide property and sometimes conflict is raised because of the unclear boundaries one of the local elders told the researcher. A road leading from and to the northern part of the settlement is covered by water and dongas and during rainy season it is totally impossible to cross the area. Theft is a common phenomenon and five interviewees revealed that most of the women who are not working have no choice, but to be homebound to guard thieves while their husbands travel to the city centre for their daily jobs. Recently they constructed a community policing building, but no presence of police has been observed.

1.9 Research outline

The research is a four chapter study that consists of 116 pages including appendices and references. The following structure was adopted in order to address the objectives of the study:

First chapter: The first chapter introduced the study area, explaining the motivation of the study, the objectives and methods used to carry out the study, the design of the study ethical considerations and the problem statement.

Second chapter: This chapter consists of the literature explored, newspapers, published and unpublished thesis, academic books and news bulletins. Case studies from two Asian countries and other neighbouring African countries were reviewed to unfold the impact of shack fires.

Third chapter: This chapter analyzed primary data collected by interviews and observation to come up with the study findings. The chapter was interpreted by the researcher based on the information provided, observation and legislatures and by laws of the country.

Fourth chapter: This chapter concluded the study by summarizing the finding of the study based on data analyzed, objectives and study orientation; the summary assisted the researcher to come up with recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2. Introduction

This chapter explored the impact of shack fires on household and community in Asian countries and neighbouring South African countries as sources of literature. It also used a vulnerability assessment model to measure the degree of vulnerability of the investigated community. The meaning and causes of shack fires were also explored. It also explored the meaning of shack fires, and how it can negatively affect households and communities health-wise, socio-economically and psychosocially by referring to different sub-saharan and Asian countries. The impact of shack fires on South Africans was also looked at provincially to import the mitigation measures used in other provinces and other countries to the J.B. Mafora informal settlement's situation.

2.1 Background

Fire is one of the major hazards that affect many parts of the world since the twentieth century, Shelton *et al*., (2004).He continues by saying even though fires have been the secondary cause of death in South Africa, over the years its impact has been overlooked in most provinces of the country. A report by the UNDP (2008) highlights the factors that causes residential fires in informal settlements as including, but not limited, to improper use of electrical appliances, faulty connections, smoking, heating appliances or improper disposal of wood ashes. People's vulnerability could be compounded by the energy sources used such as candles and paraffin stoves in informal dwellings.

The factor that escalates the number of shack fires in the informal settlements is the type of land as it has not been serviced for housing and has been previously unoccupied. Often this land is owned by the municipality or big corporations. If land is expensive then rent is expensive. Rent in the city is too high for ordinary people to afford therefore they resort to living in shacks; in

most cases the land is not legally theirs. People who live there are denied the right to live there and live in fear of eviction. They are also denied the right to build with bricks, if they manage to stay on the land. Settlements are still not allowed to expand and shacks are not allowed to be formalized. When fires happen in the shacks they are bad because in most cases the shacks are so close together. Municipalities refuse to allow shack settlements to expand and so people build houses where they can.

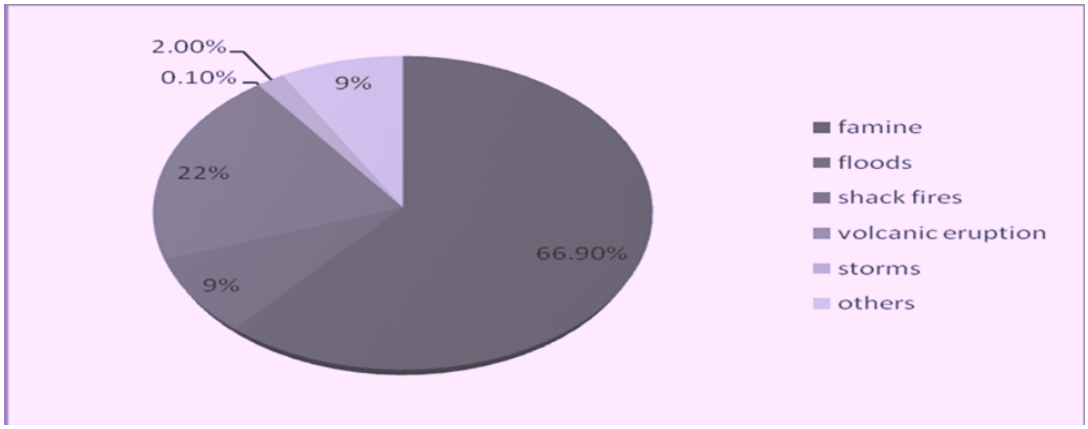


Figure 2.1: Hazard types and their contribution to death 20th centuries (UNDP report, 2008)

According to the United Nations (UN) reports quoted by CNN, June 2009 an estimated 200 million people died as a result of shack fires with an estimate of one third being in sub-saharan countries. Historically, South America and Southern Africa and other regions of South Asia have had high prevalence of shack fire related death. Birkinshaw (2008) argues that it is a well known fact that there is enough land in the world for everybody to settle where they want to. Sadly shack fire related deaths still affect one out of every seven people in the world today; therefore from a statistical perspective the last census recorded the current world population as
4, 712 200 000. The number of shack fires recorded was 798, 900 000; therefore (17%) of the world population has been affected by shack fires directly or indirectly. The formation of Working on Fire (WoF) instituted a framework for fire fighting making it the only appropriate and immediate short- and long-term response fire fighting in South Africa other than the municipalities. According to WoF the increase in informal settlements in South Africa has made

it the prime recipient of aid. Developing countries usually experience shack fires and they require assistance to save the lives of people concerned.

2.2 Impacts

The term impact refers to change or set of changes that are brought about by a policy, project or intervention. Barrett (2002).The change may be positive or negative, desirable or not, anticipated or not. It is normally measured by the goal of the project and is done after the project has been implemented from midway through. Social impact assessment includes processes of analyzing, monitoring and managing the intended and unintended social consequences of planned interventions, and any social change processes invoked by those interventions both negative and positive. The impacts of hazards differentially affect people, their livelihoods, health, institutions and ecosystems.Linnerooth-Bayer (2006). People are affected differently due to their differing vulnerabilities as determined by their exposure to risk, sensitivity of their particular environment and the level of resilience of the various individuals and communities. Wisner *et al.*, (2007). A recent review of the social impacts of fire was carried out and it was suggested that a broad definition for social impacts should be used: all impacts on humans and on all the ways in which people and communities interact with their socio-cultural, economic and biophysical surroundings (IAIA 2003:2). Walker *et al. (*2005) divides social impacts into a number of broad categories:

- Economic impacts
- Non-economic losses
- Impacts on physical health
- Impacts on psychological health
- Impacts associated with evacuation and temporary accommodation;
- Household disruption
- Community and neighbourhood changes

The above will be further explored in this chapter to really unpack the objectives of the study.

2.2.1 Impact assessment (IA) of shack fires

Hazards such as earthquakes, tornadoes, floods, wild and shack fires turn into a disaster when they have an impact on people and their social structures. According to the reports of the Mangaung fire department (2009), shack fires can affect small areas lasting for a short time ranging from one minute to a day. Distinctively shack fires are a sudden onset hazard that lasts for hours varying with season, location of the shacks and the wind directions on that particular day. The impact is also immediate. Shack fires in J.B. Mafora occur mostly in the winter season, impacting the most vulnerable as they may be homeless for a certain period of time and that could expose them to the harsh cold winters of Bloemfontein. The social variables this project looked at are:

2.2.1.1Psychosocial impact

During a disaster people suffer stress therefore they are likely to be psychologically impacted; signs of anxiety might be depicted long after the disaster has happened, depression and grief as well as behavioural and substance abuse are also part of psychological behaviour. Psychosocial impacts also include trauma and grief, which cannot be put into monetary value the loss of loved ones, and the attachment families had to their environment prior to the disaster. The study looked at these impacts as they are most ignored in the majority of impact studies.

2.2.1.2 Socio-economic impact

The impact of fire can result in reduced quality of life of the affected community. Livelihoods are disrupted, school books and uniforms may be burned in the fires therefore the children may lose school days, and that can affect them academically. Parents might be off work due to burnt clothes and important documents might be lost in the fire. The family routine might be disrupted temporarily as they might be forced to seek shelter with friends or relatives. Most people in informal settlement save their money in their houses so their entire savings could be lost in the fire. Assets may be burned during fires and that need to be replaced for the people to have their livelihood back**.** It is very difficult to explicitly draw a line between social and economic impacts due to disasters as these two are interrelated. Loss of belongings due to fire for example furniture, finance is needed for replacement. Disasters like extensive fires for instance have a

bearing on both the social as well as the economic aspects of the affected community. It is very important to avoid judging the social impact of disasters on the economic impact only; though an understanding of negative economic impacts are a good indicator of social impacts.

2.2.1.3 Socio-demographic impact

People are made homeless during fires, in most cases these are the marginalized group. It could take years to rebuild their homes if not forever, that can force them to live off government grants or from hand outs from friends, relatives or even NGOs. The destruction of household dwelling is the most significant socio-demographic impact of a disaster stricken community as after disaster affected households have to be provided with temporary shelters. In most cases these populations are of low or no source of income to draw from for recovery so they are forced to accept temporary housing as their permanent homes.

2.2.1.4 Cultural impact

Cultural impacts include the temporary loss/alteration of culture by the affected community due to the impact of the disaster. For examples most African countries have sacred places in their houses where they perform their rituals that can be lost to fires. Some cultural heritage and treasures may be lost during the fires never to be regained.

2.2.1.5 Socio-political impact

During a disaster victims may be easily mobilized mainly due to fear or unstableness of their mind. Issues of shelter and food supplies can cause major political issues, as most people eat different food, issues like their shelters being far from their work place or their children's schools may cause political conflicts. The condition and the size of the shelters may be another issue that can push political arguments within the displaced people as they might even feel that members of some political parties are better catered for. These grievances may cause political impacts during response and recovery phases especially during shack fires as that is definitely a disaster where shelter is most definitely a need.

2.2.1.6 Health impact

Most informal dwellers know for sure that smoke inhalation from fires can be a health hazard by experience. Carbon emissions from smog causes chest pains and in many cases has caused death, The 2011 Struisbuilt care centre fires in Spring Ekurhuleni municipality saw 12 people dying due to smoke inhalation and 26 being admitted to hospitals because of smoke inhalation and minor burns. This highlighted again the inability of the municipality to urge care centres to have Disaster management evacuation plans, defying SADMA's requirement of disaster plans.

2.3 Vulnerability assessment (VA) of shack fires

Vulnerability plays a significant role in the degree of disaster impact Sinha (2006:122). It is important to understand vulnerability in order to assess risk. Vulnerability is a function of many factors and has been studied by various researchers like Turner, Bohle and Wisner. The common factor in all their research is that without the knowledge of vulnerability there is no way risk to a certain hazard will be known. The vulnerability of the J.B. Mafora people is being drastically affected by the number of shack fires reported every year Mangaung fire department (2009).

This makes it essential to put in place strategies and programmes to respond to the effects from a disaster risk reduction perspective. Assessing vulnerability in this community demonstrated how individuals or groups of individuals were vulnerable to shack fires and its characteristics with direct relation to their exposure, their sensitivity and level of resilience developed over the years. Turner *et al* (2005). State that the primary objective of assessing vulnerability is to get analytical data to support better informed decisions for making ways to progress to safety, and to also make informed decisions on the planning and implementation of risk reduction measures. Moreover an effective VA will contribute to greater understanding of the nature and level of risks that vulnerable people face, what initiatives can be taken to reduce vulnerability and strengthen the capacity of people at risk. It will also identify, who will be the worst affected, where the risks come from, what means are available at all levels to reduce the risks.

Davis (2005:3:6) indicates that VA is used to identify specific vulnerable groups or individuals based on indicators such as gender, age, health status, disability, ethnicity and many others. This study identified vulnerability of the people of J.B. Mafora by using the following indicators

gender, age, marital status, household size and the level of education. For assessing vulnerability there are many conceptual frameworks and models developed in order to fully comprehend the concept of vulnerability by writers such as Turner *et al.* and Blaike *et al*. (2005).Most advanced vulnerability models emphasize that the key dimensions of vulnerability of different groups are social, economic, institutional as well as environmental. The study did not look much into the environmental dimension as the study findings found that not much damage was done to the environment by the shack fires. The pressure and release model (PAR) adopted in this study to assess the vulnerability of the people of J.B. Mafora, was first introduced by Davis in 1978, it was then refined by Blaike *et al.(2005).*The model highlights the dynamic pressure that makes the people of J.B. Mafora vulnerable to shack fires. It also highlights the root causes of their vulnerability by showing those conditions that are not safe and pushing this community to be more vulnerable to the dynamic pressures.

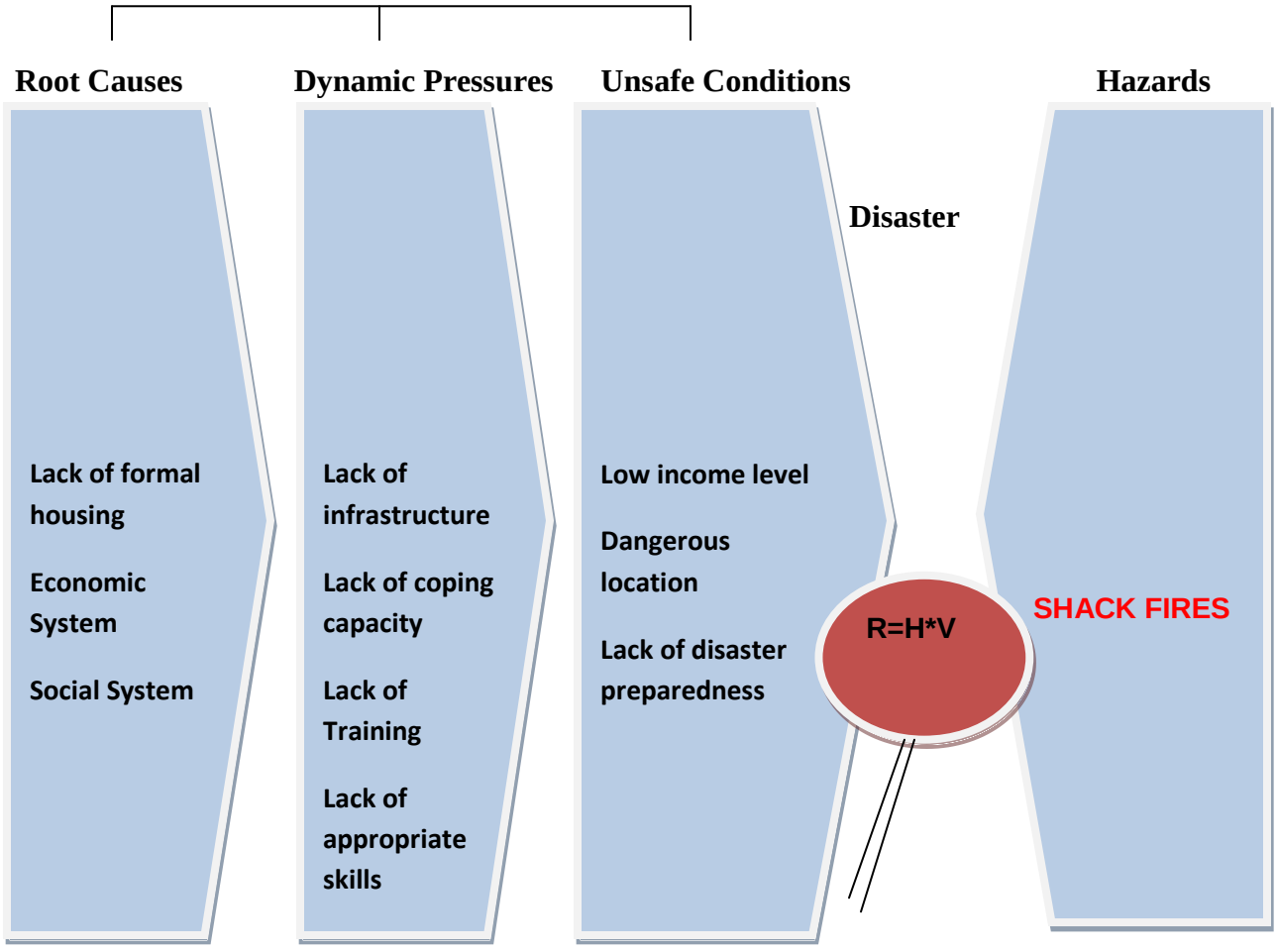


Figure 2.2: Progression of vulnerability at J.B Mafora informal settlement

2.3.1 Application of the PAR model

The PAR model (Figure 2.2) was applied to the people of J.B. Mafora to determine their vulnerabilities and the main root causes were found to be lack of housing and socio-economic issues amongst others. Some of the dynamic pressures in this community were found to be lack of infrastructure, lack of coping strategies, lack of training and appropriate skills. Indicators that the study found to be putting the community of J.B. Mafora into unsafe conditions, progressing to vulnerabilities of low income level, dangerous location, lack of disaster preparedness and level of education amongst others.

2.4 Global perspective of shack fires

In the field of natural and man-made disasters, fire has played a predominant role. The extrinsic effects of disasters caused by fires have progressively changed over the centuries, especially in the twentieth century; there has also been a change in the number of mortalities and numbers of burn injuries. A number of reports have been made on the impact of shack fires on informal dwellers. According to Mason (2004), shack fires in Africa continue to worsen. He points out that whilst the average developing world figure for shack fires in sub saharan Africa is ten per cent and five per cent for central Africa, the number of reported shack fire emergencies since 1908 has trebled (WoF).This leads to the other aim of this section; chronological analysis of different worldwide typologies of fires to see holistically how fires are affecting the world, and the cause thereof.

2.4.1 Main fire disasters from 1900 to 1969

Fire disaster is defined as an event involving more than 25 deaths. However, discrepancies exist as to the number of injuries in accidents. The historical analysis of fire disasters in the twentieth century shows the need to devote more attention to the control and prevention of fire related accidents. Currently few specific international organization assistance models for serious emergencies are available. As depicted by table 2.1, the first accident in the period concerned occurred in 1900 in Hoboken, USA, with a high number of deaths, 326. The main reason for most of the disasters in the period was the lack of prevention and safety regulation.UNDP

(2007). This is testified by certain accidents such as the fire in 1903 in the Iroquois theatre in Chicago leading to 602 deaths, where no fire system was installed, and the fire at Lakeview Elementary School in Ohio in 1908, when the absence of a fire detecting system and fire and safety equipment caused 176 deaths, mostly children. Hospitals were often involved in fires, including a case in 1929 in Cleveland, USA, due to the accidental burning of X-ray film, causing 123 deaths.

Accidents in nightclubs without safety regulations caused serious disasters, including one at the Coconut grove nightclub in Boston in 1942, when 500 people died. After the Second World War, industrial and economic development, together with a progressive improvement in the quality of life, diversified the nature of fire disasters, and flammable liquids were more frequently involved. This was reflected in the great number of accidents in various parts of the world due to the explosion of oil depots, refineries and vehicles transporting flammable materials. There were significant and singular accidents in circuses, including one in 1944 in Connecticut, with 144 deaths and more than 450 injured, and one in 1965 in Niteroi (Brazil), with over 400 deaths and 600 injured. These accidents demonstrate how the lack of prevention and safety regulations can cause serious disasters. Fire was a constant and singular presence in hospitals, where the lack of prevention programmes and organized evacuation plans led to many burn accidents global fires SITREP. (1972).

Table 2.1: Fire disaster from 1900-1969 *(Source:J. Trauma, 58: 487, 2005)*

Date	Incident	Dead
30.6.1900	USA, Hoboken, New Jersey. port	326
20.9.1902	USA, Birmingham, Alabama. church	115
30.12.1903	USA, Chicago. Iroquois theatre	602
12.12.1942	Canada, St john's, Newfoundland. hotel	100
7.9.143	USA, Houston. gulf hotel	55
16.12.1958	Colombia, Bogotá. depot	83
12.3.1960	Korea, Pusan. chemical plant	68
14.7.1960	Guatemala, Guatemala city. hospital	225
13.11.1960	Syria, Amude. cinema	152
4.5.1963	Senegal, Diourbel. theatre	64
23.11.1963	USA, Fitchville, Ohio. nursing home	63
7.12.1966	Turkey, Erzurum. barracks	68
16.7.1967	USA, jay, Florida. prison	37
11.5.1968	India, Vijayawada. saloon	58

2.4.2 Fire disasters from 1980 to 2000

With regard to these decades it is possible to see the involvement of the entire world in diversified accidents compared to the former period, when the USA and Europe were mainly involved. This has been attributed to changing political and social conditions particularly as regards accidents in the UK during periods of racial protest and considerable increases in industrial productivity. Table 2.2 shows that even if there were a reduction in the number of accidents, the failure to standardize all safety regulations caused serious disasters. This period saw the first approach to organized first-aid emergency plans, although no official project has been found in the literature. Since the 1980s the diversity of reasons for burn accidents has been linked to various human activities, one which has increased considerably is the number of fire disasters caused by terrorist criminal activities. Some examples are the terrorist attacks in Dublin 1981, Bologna 1985, Barcelona 1987 and London 1988, which were the most devastating to occur in Europe.

Analysis shows an increase in fire disasters caused in different ways after air accidents, with a variety of injured persons involved, most of them burned. During these periods, fire disasters due to the explosion of flammable material constituted a considerable portion of the total number of accidents. The worst fire disasters in the period 1980−2000 were in 1984, LPG explosion in Mexico, with 550 deaths and 7,000 people injured, of whom 625 were burned and in 1989; gas container explosion on a bridge following a railway accident in the Urals region, with 2,200 deaths and 3 000 injured, including 800 burned. Despite improvements in rescue techniques and treatment in fire emergencies, no specific organizational model for fire disasters has been identified.UNDP (2004).

Table 2.2: Fire disaster from 1980-2000(*Source: J.Trauma, 2005:58,491*)

Date	Incident	Dead
20.5.1980	Jamaica, Kingston. Nursing home	157
21.11.1980	USA, Las Vegas. Grand Hotel MGM	84
23.2.1997	India, Baripada. Church	164
17.4.1997	Saudi Arabia, Mina.	343
13.6.1997	India, New Delhi. Cinema	60
11.7.1997	Thailand, Pattaya. Hotel	90
29.9.1997	Chile, Colina. Hospital	30
29.10.1998	Sweden, Goteborg. Disco	70
30.10.1999	South Korea, Inchon. Karaoke	55
13.5.2000	Netherlands, Enscheda. Fireworks plant	20

2.5 The impact of fires on countries: case studies

To better understand the fire disasters that are happening worldwide in order to come up with better management of these fires, case studies were looked at to compare the impact of these fires and to come up with recommendations based on the case studies. The sampled countries are India, Cambodia, Mozambique, Namibia, Lesotho and South Africa.

2.5.1 Shack fire management in India

India has no registry where statistics are properly and universally recorded, but UNDP reports, estimates that India alone probably has 200,000 deaths annually from burns. In Delhi, which has a total population of 14 million, there are approximately 2,200 deaths annually from burns from shack fires. Of these deaths, 600 deaths occur annually in Lok Nayak hospital according to the reports. Extrapolating these figures to India's population of 1.2 billion produces a figure which in itself, far exceeds published global estimates.

A case study, undertaken by several specialists for Gujarat in India showed that assessments cannot be undertaken overnight. The burden of suffering from fire is exceedingly distributed among the poor who resides in informal settlements across India. The report further estimated that over 98% of deaths from fire and burns occur in informal settlements, which are least able to provide the resources for care or the community support for rehabilitation. From this information one can conclude that shack fires are not properly managed in India's informal settlements.

The rate at which these settlements will acquire experienced personnel and modern facilities for burn care will lag behind their general socioeconomic development. Over the years in India, the use of simple appliances such as stoves and lamps has resulted in inestimable damage to persons and property. This is largely a result of over crowdedness and substandard living conditions; faulty design; improper use of the building materials; ignorance; inexperience; intoxication or carelessness it was reported. The vulnerability of India's informal settlements pertaining to shack fires was proven by the study to be similar to the vulnerabilities of the investigated area.

Management strategies thereof should be similar. The report continues to explain that the flammability of fuel types varies greatly. For instance, ethanol has a low flash point that is clarified by looking at the following report; the causes of kerosene stove accidents from 1982 through 1987 which resulted in 198 patients being admitted with burn injuries to the postgraduate institute of medical education and research in Chandigarh, India.

Table 2.3: Estimates of kerosene stove accidents

Cause	Female	Male	Children
Working on kerosene stove	92%	3%	5%
Moving around stove with loose clothing	33%	29%	28%
Epileptic seizure while working on stove	81%	12%	7%

Table 2.3 shows extensive injuries, with burns greater than (50%) total body surface. Mortality from kerosene burns was higher in women than in men. In another study in northern India, of 11,196 burn patients admitted to a tertiary burn centre over an eight-year period, (29%) were due to malfunctioning kerosene stoves. These injuries represented (35%) of all flame burns. A single episode of smoke inhalation following an accident from a malfunctioning kerosene pressure stove can lead to varying grades of inhalation injury. A significant proportion, (12%) of burn victims who were present with stridor, carbonaceous sputum or dyspnea following smoke inhalation will go on to develop symptomatic chronic obstructive lung disease within six to 18 months after injury. According to the study done by Mabrouk and Sherif (2000), Kerosene stoves were the cause of burns admitted.

It was reported that in February 1994, a sudden increase in the number of kerosene flame burns occurred in four informal dwelling districts of south east Rajasthan, India. Over a period of two months, 303 patients were admitted to hospitals in Rajasthan. Most of them in a study conducted between 1992 and 1993 were from Karachi, Pakistan in the 47 adult survivors of stove flame burns. The largest burns 47% of the burns that covered the body were reported to be due to stove bursts that is, the stove disintegrates under increased pressure, spraying flammable mixture throughout the room. The typical profile of a hospitalized burn patient in Karachi in 1992-1993 was a young, uneducated woman, wearing loose clothing injured in the kitchen, around a stove. She was ignorant of fire safety, experienced prolonged contact with fire, received no aid, and was transported to the hospital in a common carrier. Sheriff (2000).The Indians' ignorance and lack of sufficient safety regulations relate to the lack of fire education in the study area making India an Asian country of choice to relate everyday issues pertaining shack fires.

2.5.2 Slum fires in Cambodia

Phnom Penh is the capital city of Cambodia, like most capital cities it is constituted mostly informal settlements. Slum fires as the Cambodians call informal settlement fires are a common phenomenon in this capital city. The slums in Phnom Penh are crowded with poorly-built wooden shacks that are built in a disorderly manner, typical of slum areas.UNDP (2001).The report continues to by saying although large neighbourhood fires are common in Phnom Penh,

the 2001 slum fires forced hundreds to flee their homes. Thousands were made homeless after a slum fire in Cambodia's capital Phnom Penh destroyed more than 2 000 homes. "*A series of suspicious blazes several years ago destroyed a number of slum areas, forcing tens of thousands to flee but the 2001 slum fires were more emotional than what the capital city has been experiencing*," said Pong Savrith, military police deputy commander.

During these fires neighbourhood residents swarmed into nearby streets struggling to rescue their belongings, while others huddled on the curb side, crying as their homes burned*." About 200 fire-fighters and volunteers worked for five hours to douse the blaze"*. Said fire Chief Sok Vannar. The fires in the Asian countries also mark a new era on shack fires, and require the urgency to study them as most reports about Asian fires are not internationalized.

2.5.3 Social impacts of shack fires in Lesotho

Sub-Saharan Africa has the highest percentage of people living in situations of poverty UNCHS (2001:15), who experience daily the realities of vulnerability to a wide range of hazards. A number of reports have been written on how shack fires can have an effect on countries. According to UNDP (2008) shack fires are continuing to worsen. The report points out that the average developing world figure for shack fires is (17%) in sub-saharan Africa and (20%) in other African countries. Literature reviewed so far indicates a wider documentation of natural hazards such as floods, hurricanes, droughts, earthquakes and technological disasters such as air pollution, industrial accidents and veldt fires, not much work is documented about shack fires though, more especially the social impact thereof. Documentation and research in the area of household fire outbreaks is also limited.

Birkinshaw (2005) in his report provided detailed information on the impact of shack fires in Lesotho. Although he acknowledges that shack fires are not acts of God, he completely blames the impacts of shack fires on political choices on local government level. The impact of shack fires do not have a negative sequence on human lives only, as the report states by referring to the damage caused by shack fires in Thaba-Tsheka, Botha-Bothe and Quathlamba areas next to Maseru in Lesotho. These are areas famous for shack fires. Shack fires cause environmental

degradation, in a form of soil depletion and wiping out of surrounding vegetation. The report starts by summarizing why these people are choosing to settle informally and the reasons this leads to shack fires:

- There is not enough affordable housing for everyone.
- Transport costs make even low-cost housing unaffordable for many people resulting in growing shack settlements next to Maseru.
- Local government policy appears to be designed to force shack dwellers to live in camps and to prevent the inclusion of shacks in the city.

Fires are increasingly frequent in shack settlements and shack dwellers face the continual threat of death, injury, homelessness and loss of livelihood because of most government policies. If fires are acknowledged at all by the Lesotho local government, they may be blamed on their victims, treated as natural disasters or used as an opportunity to replace shacks with less vulnerable government structures. The impacts of shack fires in Thaba-Tsheka area where most horrible reported shack fires incidents were a result of a paraffin stove been knocked over in a shack. In Thaba-Tsheka since 2001 there have been on average 343 shack fires a year, almost one a day. In 2007 there were 299 shack fires an average of 25 a month, the number of shack fires is increasing, both in Thaba-Tsheka and nationally according to reports UNDP (2004).The effects of shack fires in Lesotho like in most parts of the world were reported to lead to the following:

2.5.3.1 Injury and death

In 2006 141 people died in shack fires. In 2007, Thaba-Tsheka area 30 of the 62 people that died in fires were in shacks. Data from UNDP (2008) suggests that the number of deaths might be even higher than recorded. Between 2001 and 2005, a total of 543 people died in shack fires in Lesotho. The report shows how the Thaba-Tsheka area is badly affected by fires, causing a number of deaths. Matshiliso Mokoena, who was one year old, died in a fire in October 2005. It was the third shack fire in a month.

In August 2006 Likeledi Bohatsu died in a fire, killed when the plastic sheeting that was the roof of her shack melted. In April 2007 three people, Dimakatso Rametsi, Lipuo Khame and Mhlakwana Raleroli, a mother of two, died in a fire that left 100 families homeless. In October 2007 Mmamiki Letsie died in a fire that destroyed the shack where she lived with 12 other people. The other tragic fire at Thaba-Tsheka area killed eight people, five of them children from the same family. As well as causing death, shack fires also cause severe injuries due to exploding paraffin stoves, melting plastic, and the speed with which shacks burn. According to the report the Thaba-Tsheka residents are blaming the Lesotho government saying fires are a result of the policy of local government to refuse life saving basic services to shack settlements Mohale (2009).

The report continues to show financial damages, when people store money in their shacks, years of savings may be wiped out by a fire. A recent fire in Thaba-Tsheka destroyed one woman's savings of over R15, 000. However, fires take more than money. Shacks are not simply temporary accommodation, people's lives are made in these spaces, and when they burn chances of losing their entire belongings are high. People's possessions of sentimental value and memorabilia are lost, and most of them cannot be replaced. The social effects of shack fires experienced by the Lesotho people following the report and the management of these fires and the people's perspectives about the fires are not documented. Hence, the impact is much more severe as there seems to be no voice about shack fires from the communities that are affected and from the disaster management authorities.

2.5.3.2 Trauma

The report again emphasizes trauma as an impact of fires stating that fires terrorize communities in the shacks. Shack dwellers go to sleep every night knowing that they may be woken by shouting and need to flee for their lives. People may leave their houses everyday wondering whether their home will still be there when they come back. According to the report shack dwellers feel worried, scared, and they lose a little bit of memory because in most cases they do not know what is happening or what they are doing. They are afraid if the fire burns their neighbours; they will come to their shack and burn them. Most of them are afraid to leave their

children at home because if they are at work they are afraid runaway fires will burn their children to death. Most of them say they are thinking about the fires all the time.

Furthermore the report continues to blame the government for de-electrifying the shacks stating that since 2001, electricity has not only been discontinued, the Lesotho government has pursued a dangerous campaign of armed de-electrification against shack settlements. Many settlements have been disconnected from electricity by the municipality at gun point. This is often accompanied by police violence and theft. At Thaba-Tsheka, electricity connections have also led to violent police interactions, including a police shooting at a meeting held by residents to address the issue of electricity. There has also been armed de-electrification in Botha-Bothe area, where ongoing struggles against evictions, organized by the Rethabile development committee, have resulted in two major road blockades and many arrests. In August 2008 the local electricity sub-station was sabotaged. This cuts power to the whole area. The people who cut the electricity to the whole area left a note saying: "*If you remove our cables, you had better move all the power from the area. No-one can have it if we are not allowed to."*

The report looked at the demands of the informal settlement dwellers to be able to manage their own fires as follows:

- Every settlement needs taps spread throughout the settlement as well as hoses and fire extinguishers and every settlement need these immediately.
- The Maseru city must immediately reverse its 2001 decision to stop electrifying shacks.
- People who have not been connected to electricity by the city must be supported to connect themselves.
- All settlements must, wherever possible, be upgraded where they are with proper houses and these must be done with democratic and not top down planning methods.
- While people are being connected to electricity the city must ensure that everyone gets good service from the fire brigade and that all settlements get good building materials after fires.

- The fires are the result of the failure of the city to continue to electrify shacks after 2001 they should pay compensation to all the people that have suffered in the fires from 2001 to date.

2.5.4 Incidents of shack fires in Namibia

The city of Windhoek has observed a high increase of economically productive people from other regions of the country in search of better opportunity since independence in 1990 SITREP, (2000).The City's population increase exerts pressure on the local authority in the provision of basic required social services such as water, sanitation, energy, roads, land and housing amongst others. Windhoek was originally established to accommodate about 70,000 inhabitants. Today the city of Windhoek accounts for about 300, 000 Stats SA (2001) which is four times more the number.

There is limited capacity on the part of the city of Windhoek to provide land for settlement. Most of the migrants fall under low income groups according to the Khomas Regional Profile (2006); hence, their economic inability to live in other suburbans of the city rather than Katutura A township informal settlement converted area of Windhoek created in 1961 following the forced removal of Windhoek's black population from the old location which is currently known Hochland Park suburb.SITREP (2000). Katutura is divided into six constituencies, namely Samora Machel, Katutura Central, Katutura East, Soweto, Tobias Hainyeko and Moses Garoeb.The high migration rate resulted in high concentration of informal settlement buildings in very close proximity to each other rendering them susceptible to household fire outbreaks. Land availability and land tenure rights slow down the response to the growth of informal settlement.

Lack of basic facilities and infrastructures such as water, roads, and sanitation and electricity networks amongst others, impede effective response to fire outbreaks. The Tobias Hainyeko constituency is the most populous amongst the six constituencies constituting Katutura. Until very recently, the local authority emphasis has been on fire response rather than fire risk management. In 2006 the city of Windhoek started implementing public awareness on household fire risks. However, there is a need for comprehensive risk and vulnerability assessment of household fire outbreak for all informal settlements of Katutura. About 230,050 people

representing approximately (38%) of residents in Windhoek's urban area, 142, 225 reside in Katutura which is divided into six regional council constituencies.

These constituencies comprise 32,238 households with an average household size of five people. Census (2001). Fire fighters cover long distances to and from the sub-station to the informal settlement to render required services. Okahandja Park B is approximately 20km from the Central fire brigade Station. Accessing a burning house is made difficult by the lack of infrastructures such as tarred roads and fire hydrants in the informal settlement areas, limiting the fire truck to reach the scene with 5,000 litres of water. The 2008 shack fire outbreak which left 150 people dead, 55 casualties and thousands of livelihoods disrupted, has qualified Windhoek to be used as a case study in this chapter.

Reports compiled during the time of the incidence claimed no cause was found or the culprit was protected by the government as it was believed to be organized crime or politics involved. The horrific disaster will forever be remembered by the residence of Katutura as it affected the residents not only financially but also emotionally. One resident said "*in the 50 years that I have lived I have never witnessed such a disaster*", he also said he could still hear people eyes popping out in the fire in their settlement and screams of children in his sleep up to now.The Mercury, (2008), Horror in Katutura. The lack of roads in Katutura results in the ambulance and fire fighting trucks being left a distance away from the scene of fire incident according to the Fire Brigade reports (2009). Lack of telephone facilities in the informal settlement contributes to the delay in reporting fire incidents. The incident of Katutura emphasizes how diverse social impacts are; the report shows the psycho-social impact of shack fire disasters explicitly. Haynes (2009).

2.5.5 Mozambique shack fire management

As far as shack fires are concerned Mozambique is no exception with mostly inappropriate or non-existent policy responses. None of the above mentioned countries actively resists the growth of informal settlements. However, the absence of resources, weak local government capacity, and a reluctance to acknowledge the permanence of new urban migrants prevent effective management of shack fires and other hazards that are fuelled by informal settlements. The precarious nature of land tenure characterizing these settlements renders millions of people

vulnerable to shack fires. Their illegal status further hinders their access to basic infrastructure and services; a key challenge that has to be overcome in order to attain the millennium Development goals of halving poverty by 2015.

The population of Mozambique was estimated at approximately 18 million in 2002, with about 52 percent women and 48 percent men, census reports (2002). Forty two percent of the population is under 15 years of age, and only 3.6 percent is 65 or over. Mozambique is considered one of the world's poorest and least developed country, although recent surveys indicate a gradual improvement. In 1998, it was ranked 166 out of 174 countries, according to UN estimates. The following report was commissioned by UN-Habitat March 2004. In Mozambique, xiphefo accidents cause most burn deaths in Maputo central hospital. The xiphefo is a home-made bottle lamp, which is popular in informal areas without electricity. The wick is fuelled by kerosene, petrol, or even jet fuel; as with Sri Lankan lamps, the base is unstable.

2.5.6 The impact of shack fires on South African economy

During the 1980s and 1990s, severe fires resulted in socio-economic losses at both national and local level in South Africa, therefore the impact of shack fires does not only have negative consequences for communities, but also affects the economy of the country. Birkinshaw (2005). It is expected that after fire emergencies according to the disaster management Act of South Africa, (2002), a declaration of a local state of disaster by the municipal council concerned to issue directions, must be done to authorize the following:

(a) Release of any available resources of the municipality, including stores, equipment, vehicles and facilities.

(b) The release of personnel of the municipality for the rendering of emergency Services.

(c) The evacuation to temporary shelters of all or part of the population from the Disaster-stricken or threatened area if such action is necessary for the preservation of life.

(d) The provision, control or use of temporary emergency accommodation.

(e) The maintenance or installation of temporary lines of communication to, from a Disaster-stricken area.

The above provision of the Act costs the government money directly or indirectly, for example fuel used to evacuate the affected, deployment of personnel in terms of overtime money. Even though the Act provides for the above the application, is questionable as people still get trapped and die in shack fires more so than before the amalgamation of the Act in 2002.Fire protection summer (2004).The implication of the Act is that every local state vehicle should be dispatched immediately after the declaration of the disaster, fire engines, emergency medical services as quickly as possible for life preservation The reality in South Africa is different though, for every winter people get trapped and die from burning or smoke inhalation due to the delay of fire engines or call centre emergency numbers not working. In a recent case in Dayveton, Gauteng Province two boys 18 and 19 years were burned to death in the early hours of the morning, leaving behind their sister and two siblings aged 5 and 6 years when their shack was burnt down by an unknown cause. Neighbours claimed to have called the fire fighters with no luck Sunday World (2011) reported a week later that the Ekurhuleni metropolitan municipality's emergency call taking centre was not working.

Figure 2.3: Burned down shack Dayveton, (picture taken by: Researcher).

The picture in Figure 2.3 emphasizes the point that the impact of shack fires to a household cannot be ignored, as it shows in the picture nothing was salvaged in the fire except a toilet and two children by the grace of God. The social disruption caused by the 1980 and 1990 fires seriously undermined the quality of life of individuals and impacted on the fabric of affected households and communities. The situation report by Mountfield (2004) of those devastating fires does not give statistical data of the overall impact on the communities affected. Disaster damage analysis mainly focuses on the economic evaluation of tangible hazard effects while important economic, social and ecological aspects of hazard-related vulnerabilities are neglected in South Africa. Meyer (2005:23). On average over the past five years, there have been ten shack fires a day reported in South Africa, with one person dying every day UNDP reports (2004). In Mangaung Municipality in the Free State Province, on average, there is a fire almost every day.Mangaung fire department (2009). According to the department in 2009, there were 30 shacks that burned down in the J.B. Mafora informal settlement. The cause of the fire is still unknown.

The psychological impact of shack fires at J.B. Mafora informal settlement was witnessed in the 2009 devastating shack fires where a family of four was trapped and locked in their shack and eventually perished awaiting a fire engine; a three month-old baby also died in that incident. Daily Sun, (2009), reported that the mother was able to escape. She then went back to try to save her children and she was also trapped. These emotional stories headed the news for about a month in South Africa. Every winter in South Africa death and casualties caused by shack fires escalate leaving families mourning, homeless and destitute.

Figure 2.4 shack fires in J.B Mafora (Source: news24).

The picture shows the shack fires that ravaged J.B. Mafora in 2009. It is supported by the Daily Sun news paper (2009) which stated that during winter in most parts of the country people are trapped in their shacks and die by either burning to death or by smoke inhalation.

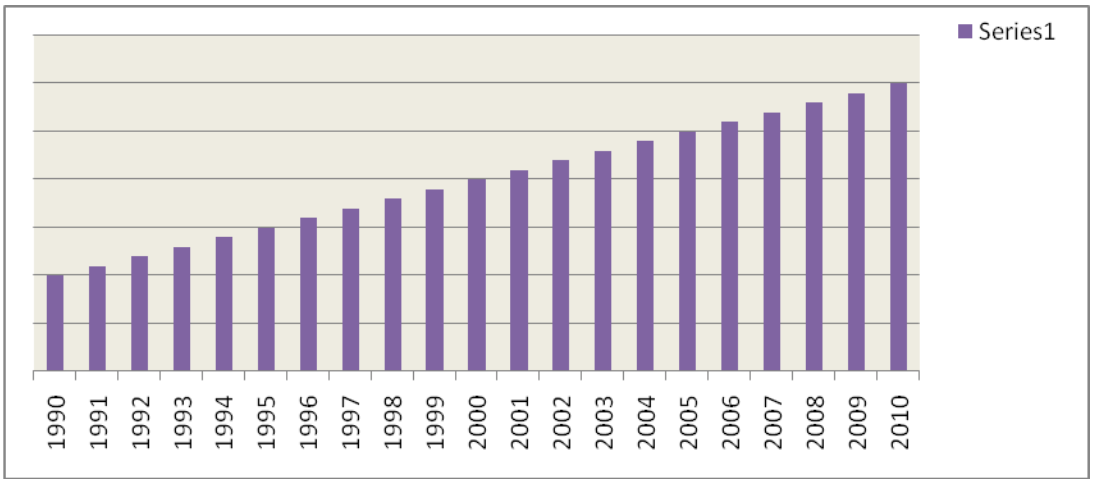


Figure 2.5: South Africa shack fire trends 1990-2010 (fire protection summer, 2004)

Fire Protection Summer (2004) provided the above fire trend which they call facts, claiming that shack fires in South Africa have been increasing from the 1990's to date, putting the development millennium goal to shame. Shack fires are framed within different systems of intelligibility and subjected to multiple layers of judgment and interpretation. The fact of their occurrence does not yield readymade understanding of how and why they happened and what they mean. This depending upon who is trying to make sense of them and for what purpose, as a growing number of scholars writing on extreme weather events have demonstrated Mustafa (2005:566–569). The ways in which technical experts, policy-makers, observers and even victims themselves frame, code and discuss such tragic occurrences strongly influence how they are understood. Across the country, roughly one in six of all South African households live in shacks. To unpack the impact of shack fires, specifically two of the nine South African provinces will be looked at, the Gauteng and the Free State provinces consecutively.

2.5.6.1 Gauteng province

Gauteng province of South Africa is the port of entry into the country, it is the province where most shacks are found as people who migrate from their countries or even locally choose to settle because of the strong economy of the province. Most people leave their home to look for greener pastures in this province that is well known for gold mines. It is in this province where most

poverty-stricken people are found in South Africa, the rich of the richest and the poorer of the poorest are found in this province. The GINI coefficient as well as poor governance in South Africa is making the country vulnerable and in Gauteng province we have a combination of both, that is why the most vulnerable people in the country are found in this province. Stats SA, (2001).

The people who enter the country and choose to settle in Gauteng are more exposed to most hazard in particular shack fires. Because of poverty they cannot afford houses therefore they are forced to stay in shacks that are close to each other making them vulnerable to shack fires. In Gauteng alone it is estimated that over 10,000 dwellings each year are razed as a result of fires. Stats SA (2001). From 2002 to 2004, between (11%) and (13%) of households in Gauteng were shacks and the number is expected to rise exponentially by Stats SA. These structures are built without proper town planning, with cramped living quarters made of highly combustible and toxic materials such as treated or painted wood and plastics, and are usually assembled close to one another on uneven ground.

Paraffin is used as fuel with cooking devices of inferior design in most settlements in Gauteng. These dangerous circumstances contribute to the rapid spread of fires between homes, making them highly unsuitable for storage and use of flammable fuels. Shack fire burns are the second most common reason for admission of patients to burn units in the Chris Hani Baragwaneth hospital according to professor Sam Mekgokong, the newly appointed president of health professions councils of South Africa.

The above factors make Gauteng a province of choice of the nine South African provinces in unpacking the impacts of shack fires. The impact of shack fires in the Free State province will be addressed by default as the study area is situated in this province. In Ekurhuleni, one of the biggest metropolitan municipalities of Gauteng province, for instance a third of the population, roughly 920,000 people live in shacks (Statistics, South Africa yearly reports). In addition, the shack fire reports listed the lack of security of tenure, use of cheap but highly flammable building materials, limited access to water, and reliance on candles and paraffin lamps as factors

contributing to the crisis of shack fires. The report also noted that since 2001, the municipality's refusal to electrify shacks has heightened the risks.

The article, published in the current issue of Left turn magazine in the USA, gives a useful overview of the militant grassroots movements in South Africa, *Sekwanele!* (Enough is enough). Social movement struggles for land and housing in post-apartheid South Africa by Toussaint Losier, he is a Chicago-based writer, artist, and activist. He is currently researching the history of mass incarceration at the University of Chicago the report noted that the municipality had pursued a campaign of armed de-electrification against settlements, particularly targeting shack communities. Two days after this mass disconnection, a fire in Ramaphosa informal settlement in the Ekurhuleni metropolitan municipality destroyed fifteen shacks and left 25 people homeless, demonstrating links between electricity disconnection and shack fires. In the predawn hours of Saturday, 13 September, 2008, a devastating fire tore through thousands of wood and zinc shacks that make up the Tembisa informal settlement in Gauteng. Sparked by an unattended candle, the fire spread quickly and raged for hours with only one water tap serving nearly 8,000 tightly packed residents.

There was little people could do but warn their neighbours and move to safety to watch their houses burn; it was going to take several hours to put out that fire. Residents later found the body of Thembelani Khweshube, 30, who had been asleep when his shack caught fire among the smouldering debris. "*I wish that somebody could save us from this misery*," lamented Funeka Nokhayingana to a local reporter from the Daily Sun, amidst the charred zinc and the damp ash. "*I have lost everything in the fire, my identity document, my children's birth certificates, uniforms and school books. It hurts me to raise my children in such conditions, but I do not have a choice because I have nowhere else to go*". Far from a rare occurrence, these shack fires have become an increasingly frequent phenomenon in post-apartheid South Africa, as the numbers of shack settlements have continued to grow.

There has been an average of ten shack fires a day over the past five years, with someone dying in a shack fire almost every other day in the Ekurhuleni municipality. In Tembisa extension 1 settlement, there is roughly one shack fire a day.Tembisa fire department reports (2008).

Recently fire has shown its cruelty in the Ekurhuleni municipality when 12 senior citizens lost their lives and 26 casualties in a fire that rampaged the Struisbuilt care centre at Springs in the east rand earlier in 2011. It was reported that the fire engines arrived an hour after ignition. Furthermore, newspapers reported that the Ekurhuleni emergency call centre number was not working at the time of the fire Sunday World newspaper (2011).

In July 1996 in Gauteng, several smaller residential fires were reported in the high-density shack areas such as Phola Park and Alexandra. The residents of Tembisa Extension 1 held a community meeting to collectively assess their situation. Rather than accepting the city's offer of relocation, residents resolved to immediately begin rebuilding their shacks using whatever materials could be salvaged from the ruins. This they did in collaboration with other members of Zulu for Shack dwellers, a social movement based in more than 40 shack settlements. Residents put out a press statement the same day, calling for emergency food, temporary shelter and building materials.

At the same time, their statement also placed the destruction of more than (70%) of their settlement in a broader political context. The government must stop blaming the victims every time there is a fire. We have to treat the fires as a crisis. We have to act against the real causes of the fires. The main cause is that people do not have electricity. Other causes are that people do not have enough taps or any fire hydrants to fight the fires according to one of the residents. The short-term solution is to electrify the shacks and provide taps, fire hydrants and access roads. The real solution is to upgrade the settlements with proper brick houses Toussaint Losier's report (2011).

In the greater Johannesburg metropolitan municipality, the poor who do not have access to formal housing accommodation have little choice but to seek shelter in informal squatter settlements that are routinely subjected to the devastating effects of raging fires. The paediatric burn unit at Chris Hani better known as Baragwaneth hospital in Soweto is reputedly one of the best of its kind in the country. It is in this unit that one sees the true face shack fires. The beds are nearly always filled to capacity with children who have been burned in ways that indicate that, had their parents had better life options, they would never go back to staying in shacks. The unit

is particularly full during the winter months when families burn fuel to keep themselves warm. City officials in Johannesburg confirmed that there were 37 604 fires, mostly involving squatter encampments, in 1997. In the following year, the figure increased by (25%) to 52,753 reported incidents. Raging firestorms had routinely ravaged impoverished squatter encampments in a veritable ring of fire said the city official.

Table 2.4: Fire storms and Alexandra *(Source: International Journal of Urban and Regional Research, 33.1)*

DATE	LOCATION	DAMAGE	CAUSE
12/08/1999	Ward 36	hundreds of shacks gutted; entire Ward destroyed; 450 People left homeless.	illegal electricity connection
27/10/1999	Angel's Home day care centre	Building for abused children destroyed; 80 left homeless.	unknown cause
13/02/2000	8th Avenue	7 shacks destroyed; one man died.	Unattended paraffin stove
19/06/2000	14th Avenue	One infant burned to death; several shacks destroyed.	faulty gas cylinder
03/092000	Unnamed squatter settlement	One man died.	unknown cause
16/12/2000	Unnamed squatter camp	15 shacks destroyed; 70 left homeless.	unattended candle
04/09/2001	Unnamed shack settlement	40 shacks burned.	Arson
12/06/2002	14th Avenue/Roosevelt Road	22 shacks reduced to rubble.	unknown cause
18/06/ 2002	Setswetla squatter settlement	70 shacks destroyed 154 left homeless.	paraffin stove overturned
5/08/ 2002	6th Avenue/London Road	90 shacks destroyed one fatality.	faulty paraffin stove
5 /09/2002	5th Avenue squatter camp	24 shacks destroyed.	faulty primus stove
7/11/2002	Unnamed shack settlement	98 people left destitute; 50 shacks gutted.	malfunctioning primus stove
9/02/ 2003	11th Avenue squatter camp	Close to 50 shacks destroyed; 96 people left destitute.	unknown cause
01/06/2003	Setswetla squatter settlement	Several families destitute.	exploding paraffin stove

While shack fires are common everyday occurrences in the informal settlements that surround the greater Johannesburg metropolitan region, most go largely unnoticed and unrecorded, and hence are excluded from public consciousness.Every once in a while a great fire storm surges uncontrollably through a shack settlement with such ferocity and devastating consequences that it simply cannot be ignored. As newsworthy events, these disastrous episodes suddenly expose the plight of the poorest of the poor, whose everyday existence is largely hidden from ordinary middle-class lines of sight, to the glare of public scrutiny.

2.5.6.2 Free State province

For those impoverished and desperate people packed into the sprawling informal settlements that encircle Bloemfontein, late May to early September is the nightmare season of fire Mangaung fire department (2008). From late afternoon to early morning, these vast squatter encampments are shrouded in the low-hanging pall emanating from countless wood burning stoves, smouldering coal-fires, and burning trash heaps. In the freezing cold winter months, when households rely on candles for light and open fire pits for warmth, inadvertent outbreaks of fire are frequent occurrences. Social catastrophes like the periodic fires that rage with relentless fury through the informal squatter settlements of Bloemfontein cannot be reduced to technical matters where problem-solving solutions rest with better education, proper engineering and availability of fire suppression technologies.Mangaung fire department reports (2009).

Most shacks around Bloemfontein are typically constructed of waste or recycled materials such as wood, cardboard, zinc-plating and plastics. These stockpiles of highly flammable materials provide an extraordinary or nearly inexhaustible supply of combustible fuel that enables even the most innocuous accidental fires that under normal conditions could be easily extinguished to quickly balloon into large, uncontrollable ones. The widespread use of coal-burning stoves for cooking, faulty electrical connections, paraffin lamps, gas cylinders and unprotected candles provide ripe conditions for easy ignition.Mangaung fire department reports (2009).

In Bloemfontein the situation is made even worse in the bitter-cold, winter months, when residents typically rely on open-pit fires for warmth. Fire suppression is made even more

difficult by the combination of spatial layout of informal squatter settlements especially in the J.B. Mafora informal settlement and the adjacent Ipopeng informal settlements, slow response time of fire-fighting teams, lack of proper equipment, and inadequate water resources. Makeshift shack dwellings are often assembled on uneven or sloped ground around Ipopeng and J.B. Mafora informal settlements and in close proximity to one another, due to space constraints, with no adequate planning for accessibility. Overcrowded shacks, clustered together in closely packed settlement patterns, are witnessed at J.B. Mafora informal settlement and typically reached only by narrow footpaths, constitute genuine fire hazards of significant proportions. Catastrophic fires are inevitable as long as municipal authorities tolerate unregulated building of informal settlements on the urban fringe without adequate means of fire prevention and suppression. Living in informal encampments puts residents at grave risk to uncontrollable fires that threaten to escape all means of containment according to Wisner (1999).

Figure 2.6: Long view of shack settlements, J.B. Mafora: by Researcher

It was reported that a man fell asleep while cooking with paraffin stove in his shack, when it capsized spreading fire throughout J.B. Mafora informal settlement in Bloemfontein. The fire raged through the properties destroying all the possessions of the occupants. The fire broke out shortly before midnight on sunday 4 January. On 22 December 2003, a fire swept through the Ipopeng informal settlement, taking two lives and destroying dozens of shacks. The presence of a water tank provided by the children of fire organization, assisted fire fighters to quell the blaze and save more homes. Reviewed reports emphasize the social impacts of shack fires in the city of Mangaung, but not as devastating as the article published by Daily Sun newspaper, March (2009), with heading *"Toddler killed in shack fire"* shocked residents of J.B. Mafora. A toddler was killed in a shack fire after her mother had left her alone. It was alleged that the mother left the child aged 19 months sleeping alone. The cause of the fire is still unknown.

A shack fire like most hazards is human induced. Most reported are due to human error; it is utopian to think that human beings will not make mistake such as falling asleep with a candle on or tremble over a paraffin stove. The above review showed that some countries, especially developing countries in Africa, even South Africa must anticipate shack fires with plans that lessen the impact on humans. Governments have to engage in all disaster continuum phases; not in response activities that relieve the stress of the impact for a short time. South Africa in particular has a long way to go as far as disaster understanding, perspective and management is concerned.

The issue of enabling the affected populations to resume more or less normal patterns of life is supported by a report by UNDP/UNDRO (1992:98-99) which stipulates that reconstruction must be fully integrated into ongoing long-term development plans, taking into account future disaster risks. Furthermore, reconstruction processes should not be simply to restore what existed previously; but to develop strategies and modalities to reconstitute services and renovate or replace essential structures such that vulnerability is reduced; and strategies should include long-term development policies and plans which take account of the current situations including any seasonal factors. South Africa as a country that is prone to shack fires because of overpopulation should promote recovery and sustainable livelihoods to enhance maximum levels of acceptable risks as far as shack fires are concerned.

2.5.6.3 South African perspective of shack fires

In South Africa the issue of shack fires always elicits strong condemnation from almost all the political parties in the weeks leading to the local government elections. This is a welcome development even though it is long overdue and smacks of political opportunism. Shack fires in South Africa are a socio-economic construct. At the heart of the problem is abject poverty. People live in congested houses, built from combustible materials. Many of them are unemployed and therefore cannot afford safe energy sources and appliances. In addition, excessive levels of alcohol consumption lead to risky behaviour and lack of proper supervision of children in the home. Sometimes children are left alone with a flame burning in the home. Any solution must urgently address these deep-seated issues.

A typical South African sustainable approach to shack fires is when many municipalities and welfare organizations become ready to react to fire and other disasters that will surely arise. They become ready with fire-fighters and water tanks to douse fires, blankets and clothes to distribute to the affected people. These are crucial activities to alleviate the people's suffering. Behind some of these reactionary approaches over many areas, there is little substance particularly when it comes to the plight of the poor. This is proved by a diverse gulf that exists between the in-depth forensic investigations that occur after domestic fires in the more affluent areas and the dismissive enquiry that results when it occurs in informal areas. However, until the issue of household energy safety receives the urgent attention of the highest echelons of political and economic power, sustainable solutions will not be reached.

The solution to this problem is a political commitment to implementing a household energy safety system. The safe access and usage of energy by all householders for their thermal applications needs to be addressed. People need access to a safe and affordable range of energy carriers for cooking, lighting and heating their homes. This applies to the safety of all energy sources namely, paraffin, gas, electricity, firewood, candles, etcetera. Research has shown consistently that almost all energy sources mentioned can and do cause fires from time to time. So the solution to shack fires lies in the safety of all these energy sources and systems.

South Africa's energy provision is heavily reliant on electricity due to availability of coal. Furthermore, a myth has been perpetuated that all household energy provision should be electrical via the national grid. However, this is not sustainable because coal is finite and it has hugely negative environmental impacts such as air pollution. Huge losses in generation and transmission are also overlooked. Apart from this, with the increasing population and migration to urban centres, our country does not have the capacity to generate and distribute electricity to all its citizens.

2.6 Conclusion

The conclusion that this chapter draws is that shack fire impact is devastating to the affected more than the world is led to believe. Based on the countries looked at to unpack the impact of these fires, shack fires in most parts of the world are not perceived as a dangerous phenomenon that causes disasters, but as life takers that rob the shack dwellers their loved ones overnight. Even though most shack fire incidences are not reported by the media due to their frequent occurrence, the point of concern is the fact that the local government treats shack fires as normality more especially in South Africa.

CHAPTER THREE

RESEARCH FINDINGS AND DISCUSSION

3.1 Introduction

Literature on qualitative data has it that the analysis of qualitative data requires some creativity in coming up with a way to interpret raw data into meaningful logical categories to better communicate it to others. Patton *et al.,* (1990). Biklen (1982) in his description of analysis, concurred by saying analysis in a qualitative research involves working with data, organising it and breaking it into manageable units, synthesizing and searching for patterns and discovering what is important and what to tell people. Furthermore, Bak (2005) notes that analysis and interpretation of qualitative data involves the mastery of a special set of interpretation practices and narrative techniques in order to make sense out of it. In a qualitative data inductive analysis is used as critical themes emerge out of the data. Strauss *et al.* (1990) in their study note that data analysis in the study begins with the identification of the themes emerging from raw data, and this process is termed open coding. Traditional tables, graphs, equations and other qualitative figures are used in the presentation of data.

This study applied different data analysis. Vulnerability equation and excel spreadsheets were used to improve on the validity and reliability of the research findings. The analysed data was also linked with reviewed literature to explore the major issues raised by the literature reviewed concerning the impact of shack fires in this community. Questionnaires were handed out and observations were conducted with a sampled population in the study area. The findings of the study were based on the information provided by these respondents. Of interest is the discovery that (95%) of the respondents use open fire for heating and cooking highlighting a ten per cent increase since the last record of Statistics South Africa in 2001. This goes to show that year after year the vulnerability of this community pertaining to shack fires increases. This chapter presents research findings derived from data collected, frequency distribution and percentage tables, graphs and vulnerability equation are used to portray this findings. Struwig (2001) notes that a

table explicitly represents primary data. Brief comments are then made on the information presented by the equations, graphs and tables.

3.2 Application of the questionnaire

The questionnaires were administered during the July university holidays, two research assisstants and the researcher administered the questionnaires at the households of the participants. Hundred households were targeted using random selection; 86 questionnaires were completely answered by the respondents.The purpose of the survey as well as the confidentiality of the information provided by the respondents were clarified.The analysis of the primary data focused on the description of the opinions of the respondents, which gave specific trends on the respondent and findings of respondent's opinions on the impact of these fires.

3.3 Section 1:Household demographics

This section deals with the profile of the respondents to better understand the population of J.B Mafora by relating to their vulnerability based on their personal profile.

Table 3.1: Showing gender distribution

Gender	Frequency	Percentage
Female	62	72.10%
Male	24	27.90%
Total	86	100%

The level of vulnerability is directly proportional to exposure. According to the study the majority of the respondents were females, (72.1%) implying that they are more vulnerable as opposed to their male counterparts, since they spent most of their time doing household chores increasing their exposure to fires. The fact that the questionnaires were deliberately administered in the afternoon in winter, around the time when the community was starting their open fires for cooking and heating and most respondents were women, justifies their level of vulnerability due to their exposure. The vulnerability of women is also noted in literature on disaster management stating that specific factors such as gender, age, disability affect vulnerability and shape people's

ability to cope and survive in a disaster context, in particular women and children The Sphere project (2004). The literature is supported by these findings as home-based women will be preparing food on open fires and lighting candles in their homes in the afternoons.

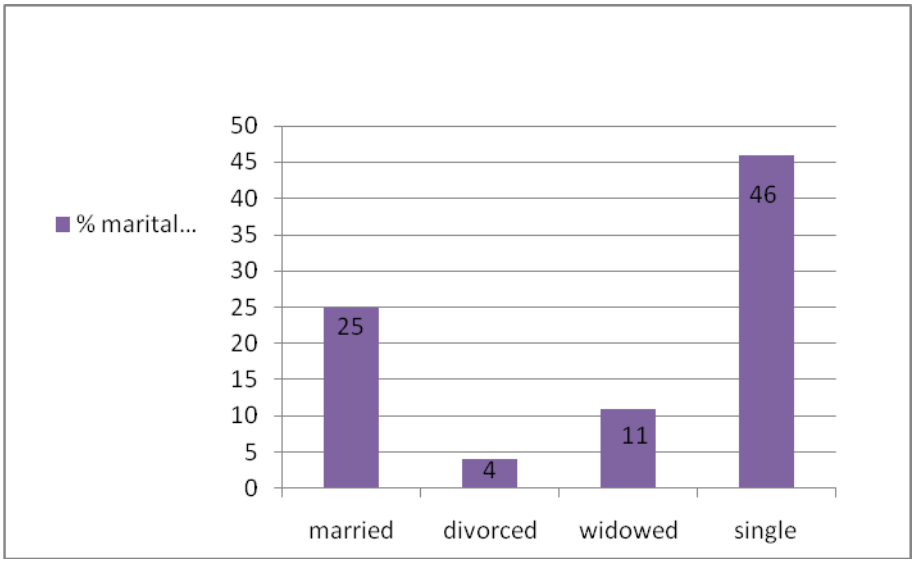


Figure 3.1: Marital status of the respondents

As shown in the Figure above the majoriy of the respondents were single (46%). By observation the financial strains of single parenthood was evident in the household surveyed. Of the (25%) of the respondents that were married only a few of them were using open fires for cooking and heating The majority was using electricity. Most of the single respondents were women according to the study findings. Naturally women will run for their children when the fires break out, increasing their chances of burning due to being trapped by fires, while men will try to salvage some of their belongings like important documents. The above logic and the study findings that most respondents were single women who lived alone with their children to some extent ,justifies the fact that singlehood or rather marital status somehow contributes to the impact of shack fires in this community as in some cases manpower will be needed to push staged doors open for a quicker escape.

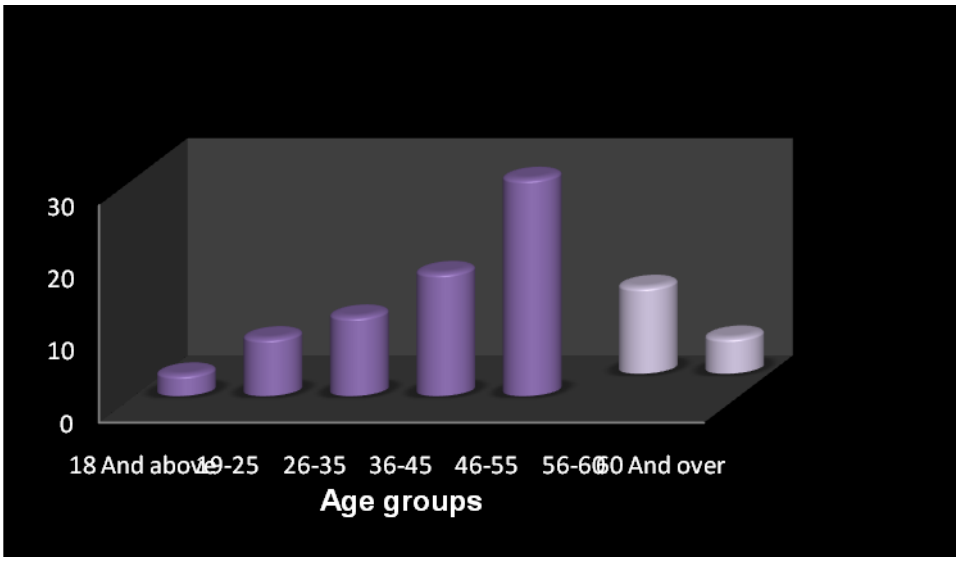


Figure 3.2: Age distribution

The age distribution in Figure 3.2 shows that most respondents were in the 36 to 60 age group. The questionnaires were adminstered during the weekend from friday throughout the weekend, meaning that the respondents comprised mainly of young women and men that stayed at home due to lack of employment. The above information creates a relationship between unemployment and poverty to the use of open fires. On the other hand the youth of this community forms the minority group, as some of them may have been at school during the holidays.The study established that most people who died or experienced shack fires were older than 35 years.

Highest Level Of Education	Frequency	Percentage
No schooling	15	17.40%
Lower primary	18	20.90%
Upper primary	12	13.90%
Junior secondary	19	22.0%
Senior secondary	16	18.70%
Higher education	6	6.90%
Total	86	100%

Table 3.2 Frequency and percentage distribution showing highest level of education

Table 3.2 shows that (22%), which is the majority of the respondents, have a junior school education. Basically, this implies that a good number of the respondents are high school dropouts, followed by (18.7%) who have a senior certificate. The study indicated that (17.4%) of the respondents have no schooling. Only (6.9%)of the respondents have a tertiary education. It can be concluded that the literacy level of the people of J.B. Mafora is directly propotional to their poverty leading to their vulnerabilities.The level of education of most respondents illustrates that they are unaware of the risks, especialy health risks they are exposed to, by sleeping with open fires or burning candles whatever the case may be.

Table 3.3 Frequency and percentage distribution table according to household size

Household Size	Frequency	Percentage
Two or less inhabitants	25	29.0%
		46.6%
Five to seven inhabitants	14	16.2%
		6.9%
Total	86	100%

The intention of this question was to find out how many people stayed in one house, thereby showing the number of people that were at risk at any given time should a fire break out. According to Table 3.3, (46.6%) of the respondents have a family three to five most of whom

are sharing a two room shack with one window for ventilation, and (6.9%) indicated that more than seven people made up their household. The overcrowdedness in most respondents' houses shown by the study increases the vulnerability in most households, increasing the vulnerability of the community. Overcrowdedness would also impact badly on the health of the occupants due to inadequate ventilation and the fact that they sometimes slept with the paraffin heater on to combat the harsh Bloemfontein winters.

3.4 Section 2: socio-economic and health impacts of shack fires

This section holistically looked at the effects of shack fires on the people of J.B. Mafora as far as their social and economic lives are concerned, and the strain put on them by shack fires. It also explored health issues experienced by these people as a result of using open fires. Shack fires increases poverty, pushing some people below poverty line.The study established that due to shack fires in this area people are set back financially and socially as they have to start buying new furniture, applying for new identity documents which take a long time. Furthermore, if they did not have identity documents they might not be able to collect social grants leaving them with no money to purchase basic food commodities.

Open fires that are currently used by most people in J.B.Mafora have serious socio-economic and health impact. Mekhokong (2007) states that the most significant concern is children's health. The paraffin used for heating as he states emits fumes that contain a combination of chlorofloro carbons (CFCs) that can affect the lungs of children causing them to cough continuously and to have runny noses.The prolonged exposure of children to these (CFC) gases can lead to turberculosis and chemical pneumonia. Carbon, also emmitted by coal used for preparing open fires for heating and cooking, can lead to lung problems both in grown ups and children.

Figure 3.3 respondents warming themselves by a paraffin stove,and child with runny nose. (Picture: Researcher)

Observation has shown that the social and economic status of the people of J.B.Mafora are badly affected after shack fires. Evidence is three houses that were completely burnt down earlier this year where the researcher was invited inside.The owners of the houses were basically living in their empty two room shacks provided by the housing department. In one of the houses there was only a bed, a crate and parraffin stove. This clearly shows the socio economic impact of shack fires in this community.

Figure 3.4 A shack provided by the Mangaung Municipality and the remains of the burnt shack. (Pictures : Department of housing galleries,Free State).

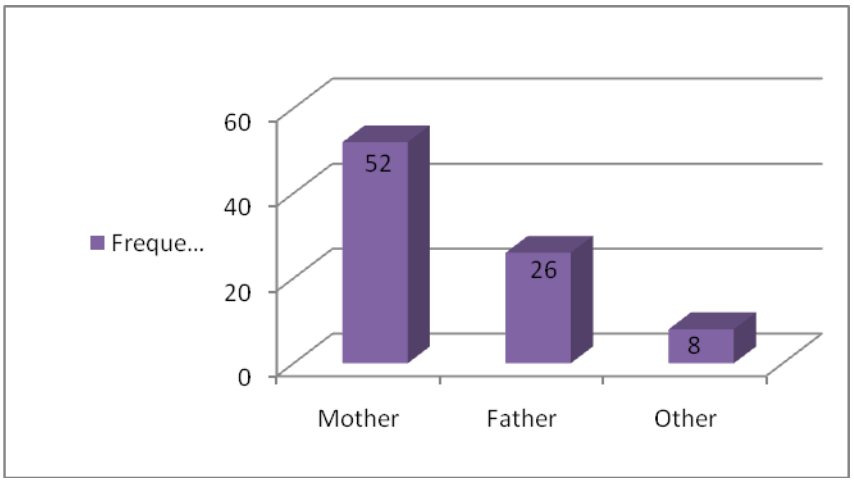


Figure 3.5: Showing household breadwinners

Figure 3.4 shows the frequency distribution of the breadwinners of the house, clearly indicating more than (50%) of the respondents being mothers. Of the respondents (30.2%) indicated fathers as breadwinners and (9.6%)of the respondents indicated other such as remmittance and hand outs from relatives. The study showed that most respondents were female and it also indicated that females were the major breadwinners, the implication being that the males had no formal jobs. Even though most of the questionnaires were administered on weekends, there were other females who were home on Friday and they were able to fill out the questionnaires saying they worked until Thursday.This confirms the classification of the Sphere Project of listing women under vulnerable groups, showcasing their exposure to fire hazards as they spend most of their time at home.

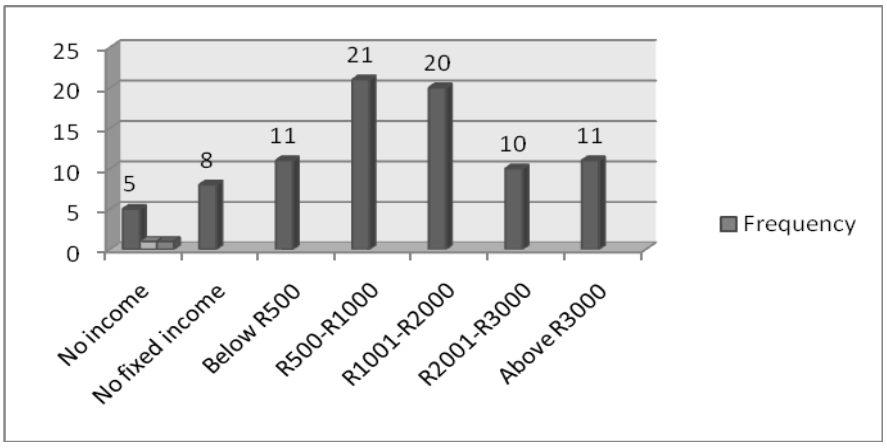


Figure 3.6: Monthly household income

The intention of this question was to find out how the respondent survive financially, as from observation almost 90% of the J.B. Mafora people live in two room shacks. Awareness of the household monthly income of the respondents will assist the researcher to understand why the majority of the population cannot afford electricity even if they are connected. It will also help to understand why the respondents cannot extend their shacks to accommodate the household size as it was established in section one that most respondents stayed in a house that has more than five inhabitants.Figure 3.5 gives a clear indication of the average monthly income of the respondents.

The majority of the respondents (18.6%) according to the figure above earn between R500,00 and R1000,00 monthly. Of the respondents (4.3%) said they did not have a fixed income, the reason for this according to the study is due to the level of literacy in the area. Most people in the community are high school dropouts according to the findings of the study therefore they are unable to secure permanent secured employment. Of the respondents (19.78%) indicated earning between R2 000,00 and R3 000,00 monthly. The low income according to the respondents was one of the reasons they could not afford to build themselves brick houses to reduce shack fires. Furthermore, they were unable to renovate the houses and improve ventilation by having at least two windows in a two roomed house as per standard i.e at least one window per room.

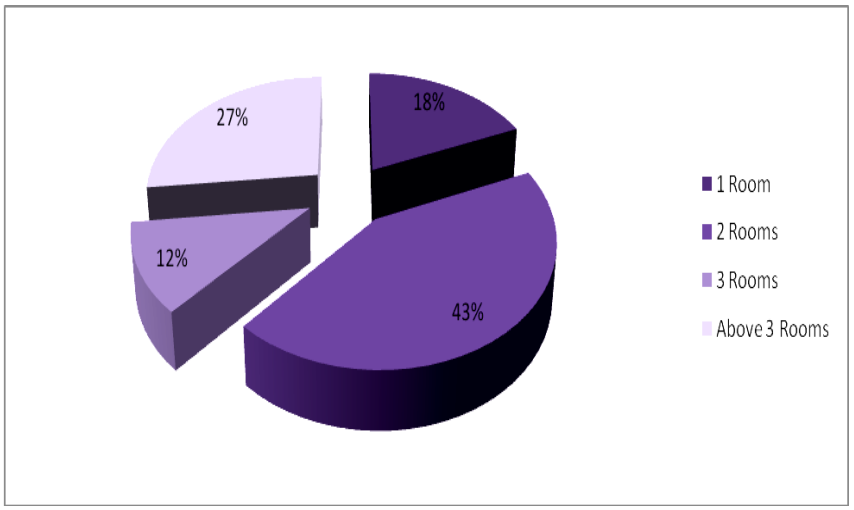


Figure 3.7: Graph showing the size of the households

As indicated in Figure 3.6, the size of the household plays a major role in the impact of shack fires. Most houses that were burnt down by fire according to observation (Figure 3.4) in this community lost everything in the fire due to the size of the household. Research has shown that in a situation where the shack has more than three bedrooms some important documents are salvaged as the point of ignition can be a bit further from the other rooms. A huge percentage (43%) of the respondents have two rooms. Of the respondents (27%) said they had more than three rooms most of which were divided by curtains which were also very flammable. High vulnerability based on the size of the household is justified in this regard.

Table 3.4: Frequency and percentage distribution according to the household ventilation

Adequate House Ventilation	Frequency	Percentage
Yes	43	50%
No	43	50%
Total	86	100%

In question 10 respondents were asked to elaborate on the 50/50 status of household ventilation in this area, as indicated in Table 3.5. Literature reviewed showed that an alarming number of deaths during shack fire incidences are due to smoke inhalation. The worst is expected to happen in a household that is not adequately ventilated.The carbon emmited by the smoke during fires circulates in the house as in most cases in the investigated area has shown insufficient ventilation in the household. The smoke will eventually block the breathing passage of the occupants and death may result in children and older people in most cases. Children are usually left with health problems. In incidences like these their defence mechanism is still not strong enough to withstand excessive smoke inhalation. Of the respondents (51%) have their houses adequately ventilated as they have both a door and a window, and 47% has no adequate ventilation, they only have the door as a form of ventilation. Table 3.7 highlights that almost half of the respondents have only a door for ventilation, rendering them vulnerable to health problems associated with smoke inhalation during fire incidences.

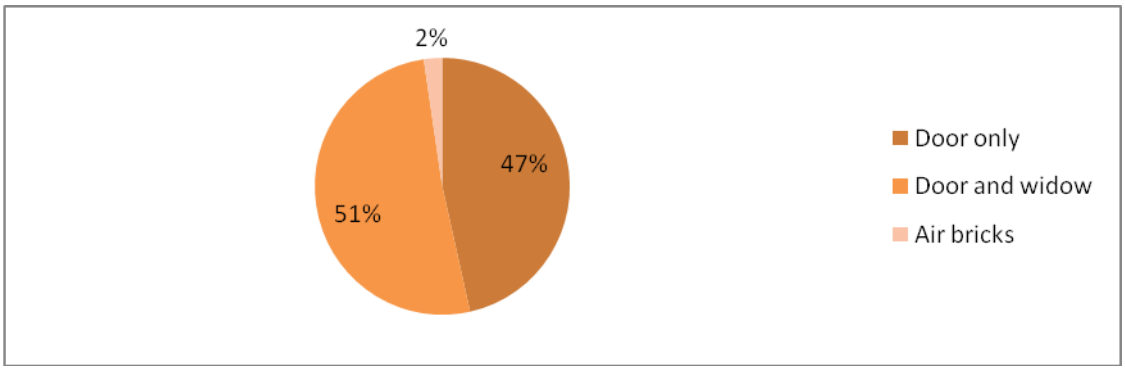


Figure 3.8:Graph showing type of household ventilation

It was impportant to get information on what type of ventilation the respondents had in their households.This information in figure 3.7,is useful in assessing the health issues that can be caused by smoke circulating in the house and escape routes in case of fires. As can be expected based on observation only two per cent of the respondents had adequate ventilation: a door, right number of windows and air bricks. Although they said their houses were adequately ventilated, 51% of the respondents had a door and in most cases one window. Of the respondents (47%) had doors only for ventilation this renders almost half of the respondents vulnerable to fires. This increases the risk of losing all their belongings considering that most households have more than seven inhabitants that have only one escape route and no time to salvage belongings in case of outbreaks.

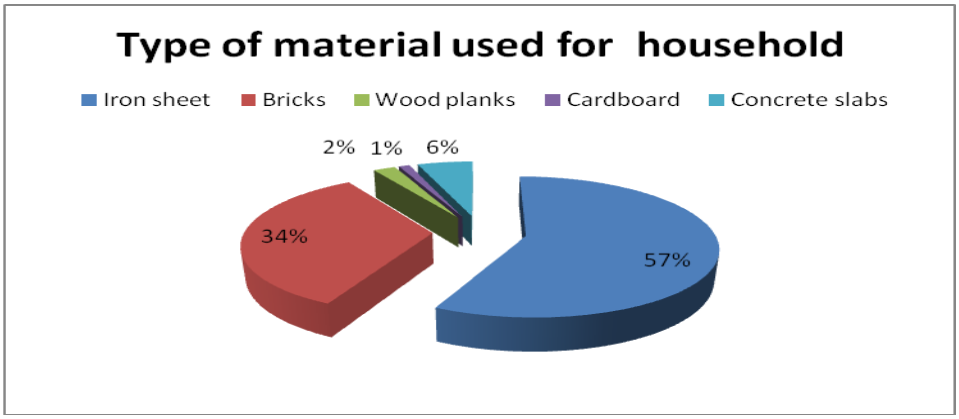


Figure 3.9:Showing types of material being used by the respondents.

According to scientific research the flammability of an object is highly dependent on the type of material. The study according to Figure 3.8 shows that (57%) of respondents used iron to build their houses. This increases their vulnerability to fires because iron is a metal that is highly flammable according to the periodic table of elements. (34%) of the respondents used bricks, most of the brick houses are government low cost housing and they do not have air bricks. Six per cent, two per cent and one per cent of the respondents used concrete slabs, wooden planks and cardboard respectively. The finding of the study shows that the type of material used in the construction of the house is a contributing factor to the runaway fires experienced in these areas.

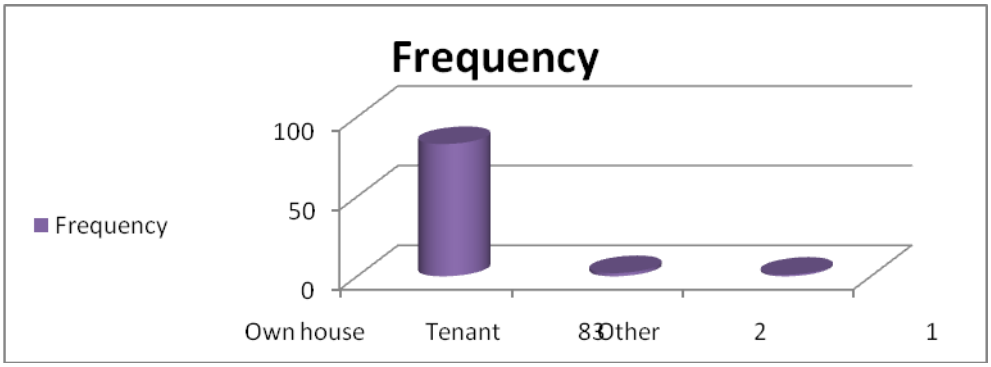


Figure 3.10 Graph showing respondent's ownership of the household

Of the respondents (71.38%), own their houses, meaning no mortgage and no insurance during fire incidences. If the house is burnt down,serious livelihood disruption is experienced by the occupants as they are supposed to replace everything themselves. Observation has shown that this is difficult as one household that was visited during the study only had a bed. The owner was only able to rebuild with the assistance of housing department that provided building material and labour after the house had burnt down. Two respondents were tenants in one shack, and one boy who was looking after the shack while the owners were away.

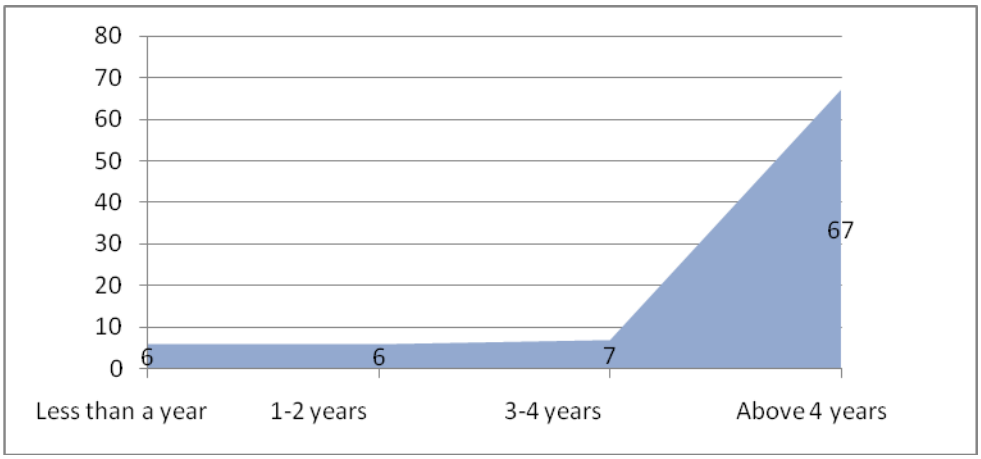


Figure 3.11: Graph showing years of stay in the house

According to Figure 3.10, (57.62%) of the respondents had been living in the same house for more than four years, and they knew at least one person that had been affected by fires in their neighbourhood. Only (6.02%) of the respondents lived in their houses four years and less. That could also imply that the building material had seen better days and needed to be replaced, especially since rusted material is highly flammable. The longer the stay of the respondents in one house the greater the risk and vulnerability to fires based on the majority's type of building material. This is justified by the famous harsh extreme Bloemfontein temperatures that will definitely destroy the zinc material quicker.

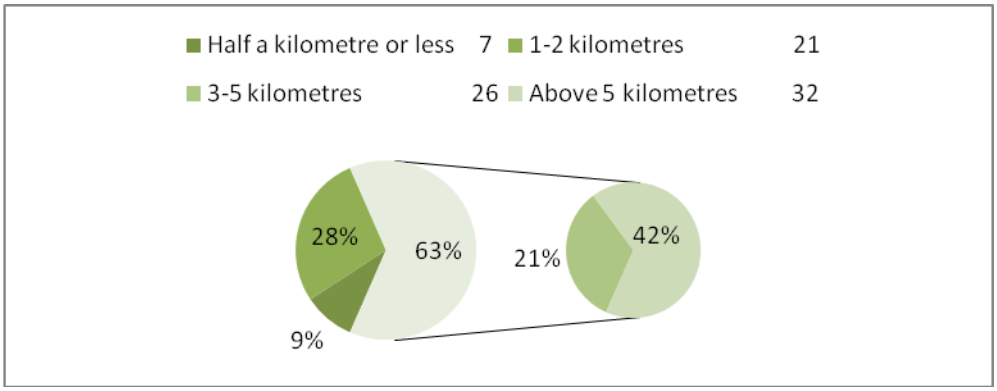


Figure 3.12: Graph showing the distance of the health care facility in kilometres

The distance of respondents' houses to the healthcare facility was asked to establish how far the victims of fires had to travel to get health care assistance; Figure 3.11 shows that 63% of the respondents indicated that they lived more than five kilometres from the health care facilities. Because of the distance as most respondents said they were not driving, secondary burns could escalate, also the effect of smoke inhalation could increase, especially among children as their lungs are not strong enough as yet. Of the respondents, 37% lived fewer than five kilometres from the health care facility. Relevant stakeholders should be involved to come up with a mitigation measure to assist these areas with alternative health care services.

3.5 Section 3: exposures to hazard (fire)

Exposure to hazards was noted by most vulnerability assessment models as a function of risk. The more exposed an individual or communities are the more vulnerable and at risk they are. The exposure of the people of J.B Mafora was looked at to determine the vulnerability and the risk level of this community pertaining to these fires.

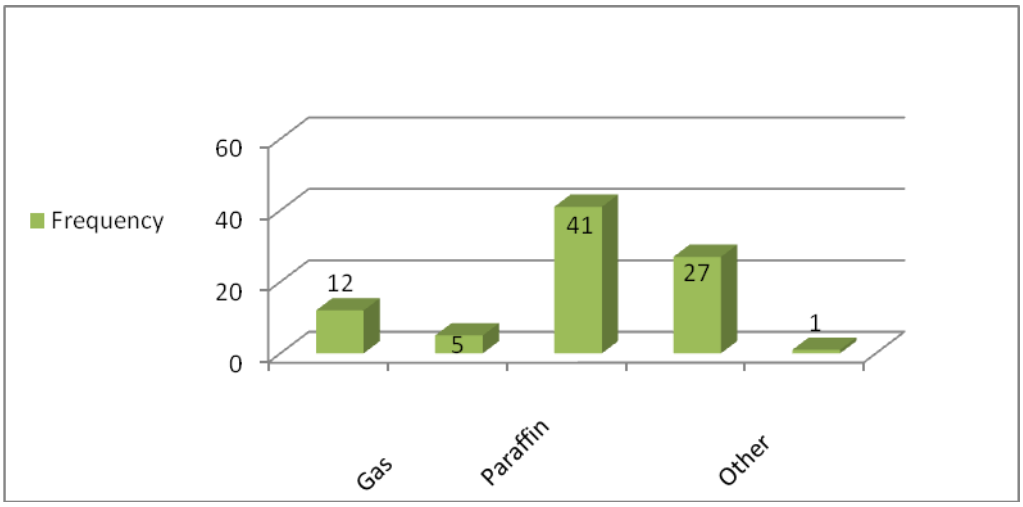


Figure 3.13: Main source of power for cooking

The purpose of this question was to establish what the respondents mainly used for cooking, to try and draw conclusions pertaining to the fires that were experienced in this settlement. As Figure 3.12 indicates the majority of the respondents (35.26%) used paraffin as a source of

cooking, while electricity was used by 23.22% of the respondents. The remaining 15% of the respondents used firewood, gas and other forms of fuels for cooking like cow dung. The majority of people using paraffin were vulnerable to paraffin stove explosions rendering them vulnerable to fires. Also paraffin is a health hazard according to a study by professor Sam Mekhokong**.**

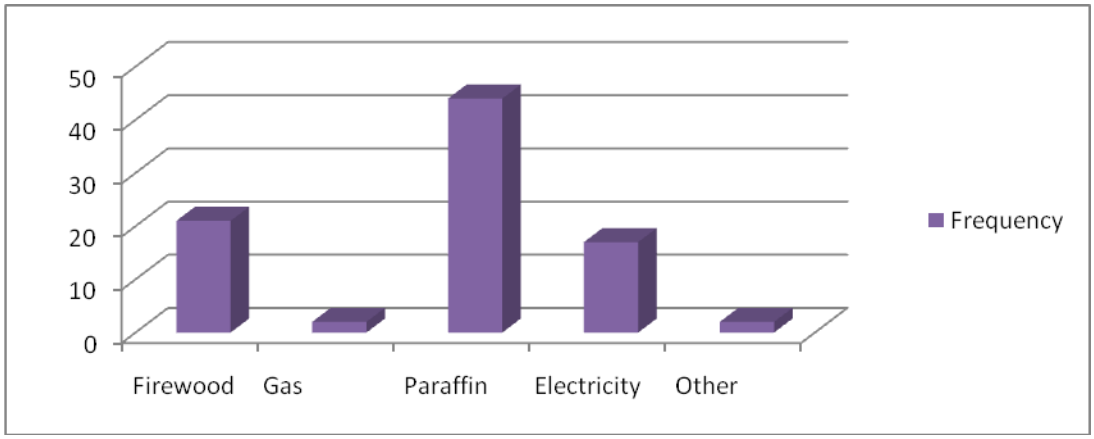


Figure 3.14:Graph showing main source of power for heating

This question required respondents to state their main source of fuel for heating. Figure 3.13 indicates that the majority of the respondents used paraffin for heating. This will establish how exposure plays a role as one of the components of vulnerability. Open flame is very dangerous more especially if it is of a pressure nature, combustibility is too high. Study has shown that most shack fires in the investigated area were caused by people knocking over the pressure stove. According to the study paraffin is one of the causes of the fires that were ravaging the people of J.B Mafora throughout the year. Of the respondents (39.6%) reported using paraffin as a source of heating. By observation the paraffin stove when used for heating was opened fully [see Figure 3.3] so that the house could heat quicker. Literature reviewed, showed the health impact of inhaling paraffin smoke and the repercussions thereof.

Table 3.5: Showing respondents who know people who had been affected by fires

In Area Affected By Fires	Frequency	Percentage
Yes	50	58.1%
No	36	41.9%
Total	86	100%

The frequency and percentage distribution in Table 3.6 shows that (58.1%) of the respondents knew people who had been affected by fires in their community. Some of the respondents specified that they had been affected by fires, mentioning that their livelihoods were drastically changed by these fires. Of the respondents (41%) said that they did not know anyone who had been affected by fires in their area. According to the study most people who knew people who had been affected by these fires were unemployed, meaning they were more aware of what was going on in their community as far as fires were concerned. Study has shown that awareness on its own will not reduce the number of fires that are happening at any given time. Willingness and change of mindsets which were not visible in this community are the driving forces of risk reduction. Wisner *et al., (2004*).

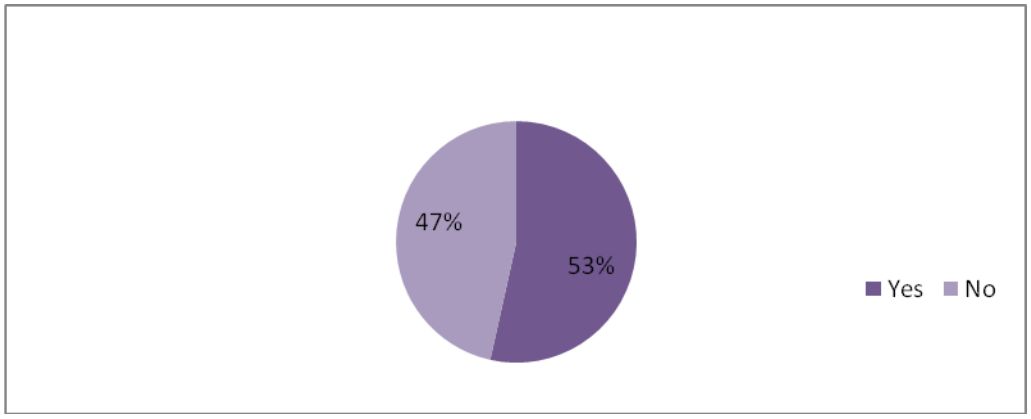


Figure 3.15: Respondents who know people who died in shack fire related incidences

Figure 3.14 illustrates that (53 %) of the respondents reported that they knew people who died in shack fire-related incidents and the cause of the fires. Most of the (47%) of the respondents that said they did not know people who died of fire-related incidents, were not convincing to the

researcher and the research assisstants. Nevertheless, the fact remains that shack fires are claiming lives in the J.B. Mafora community, and surviving strategies need to be put in place, sooner rather than later.

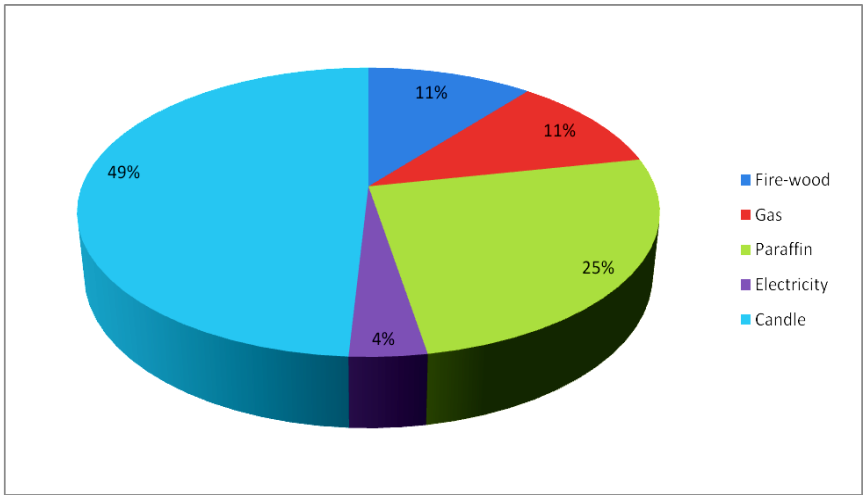


Figure 3.16: Causes of fire that resulted in people dying

In relation to fires that resulted in death of the people of J.B.Mafora, Figure 3.15 shows that candles managed to score (49%) as the main cause according to the study findings, followed by parrafin at (25%) with firewood, gas and electricity forming the remaining (26%) of the cause of these fires. According to the respondents, in most incidences of shack fires the victims died in their sleep having forgotten to put out their candles before falling asleep. This leads to the candles becoming the most problematic and main source of ignition followed by parrafin.

3.6 section 3: Organizational arrangements

This section will enlighten the researcher as well as the readers about disaster management awareness amongst the people of J.B Mafora, especially fire disasters. It will also highlight the availability and awareness of disaster management organizations accessible to the community. This information will establish how quickly and easily assistance can be accessed during or even after fire incidences.

Table 3.6: Availability of assistance during and after fire incidence

Assistance from the Government or Disaster Management	Frequency	Percentage
Yes	26	30.2%
No	60	69.7%
Total	86	100%

This question was answered by all respondents, and (69, 7%) of the respondents stated that they never received assistance from government or any disaster management organisation and non-governmental organisation during and after fire disasters. As portrayed in Table 3.7, (30.2%) of the respondents stated that they received some form of assistance during and after a fire incidence, most of the (30.2%) were personally affected by shack fires. As the majority of the respondents indicated that they did not receive any form of assistance, this study question shows the gap between the government and these communities. More involvement of role players and community leaders is required when it comes to assistance in this regard as the findings have shown.

Table 3.7: Time it takes for assistance to be available

Speed of assistance in case of fire in your area	Frequency	Percentage
Within hours	9	10.4%
After a day	12	13.9%
Within a week	16	18.6%
After a month	24	27.9%
Never	25	29.1%
Total	86	100%

This question required the respondents to indicate how soon they received assistance during and after fire incidences and (29.1%) responded never, while (27.9%) responded after a month. Only 10.4% of the respondents said they received assistance within hours. The study results indicated

that response time is slow; measures needed to be devised to come up with ways that could speed up response time. Assistance within hours after the disaster was indicated by (13.9%) of the respondents. The implication is that assistance given hours after disaster should be increased for life preservation, and to assist the affected to resume their normal lives as per the provision of the humanitarian charter.

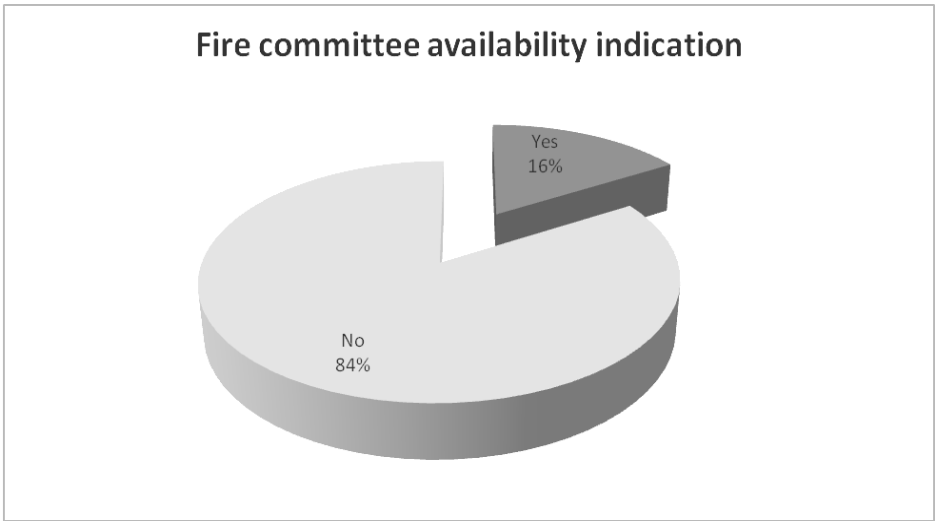


Figure 3.17: Showing the availability of fire settlement committes

Figure 3.16 indicates (84%) of the respondents not knowing of any settlement fire committee, while (16%) of the respondents had knowledge of settlement fire committees. When this question was asked it was immediately evident that most respondents were clueless about the committee. Most of them said while they had experienced lots of fires especially during winter times, and they had not given it some thought.

The study definitely gave some of the respondents something to think about. The 16% that said they knew of the existence of a fire committee said that it was not a formal committee, but more of a response committee where they met only after fire incidences to discuss the way forward and ways to assisst the affected in terms of provisions. No scheduling of formal meetings when

and even during these fires. They said they only gathered at the affected household and offered their assisstance as a community. The finding of the study is that there is no real fire settlement committee in this area where the committee members discuss mitigation, preparedness and recovery measures in case of shack fires.

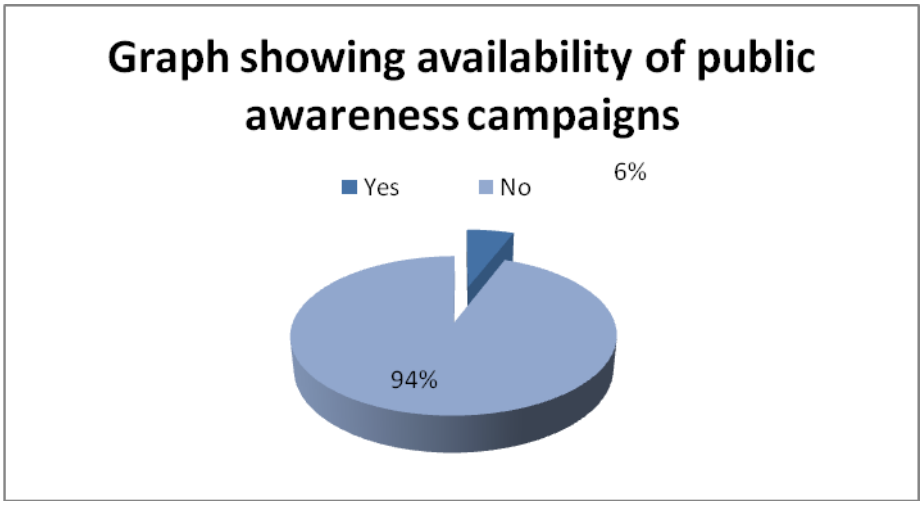


Figure 3.18: Showing availability of public awareness

As Figure 3.17 indicates, public awareness campaigns according to the respondents are unavailable to at least (94%) of the respondents. There were no formal awareness campaigns by the Mangaung municipality as the study revealed. The six per cent that was aware of these campaigns were scholars most of which learned about the campaigns at schools.The Mangaung municipality together with relevant stakeholders can work together to educate the people of J.B Mafora about the dangers of fires, like other municipalities in South Africa where most of these campaigns are run, and start as early as May every year.

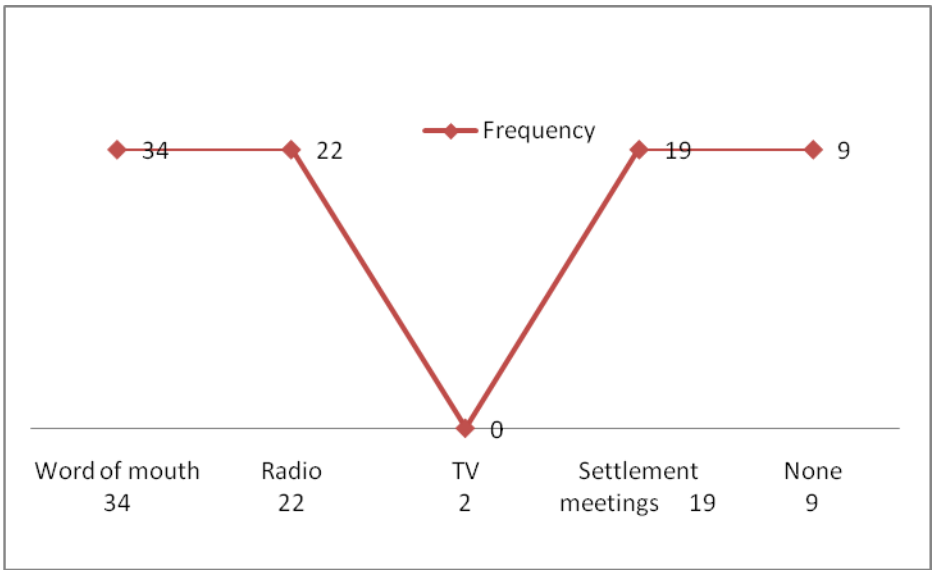


Figure 3.19:Mode of fire warning dissemination in the community

This question was aimed at finding out how fire warnings were disseminated in the community. Of the respondents (16.34%) said through settlement meetings, where the community leaders will inform them about lives lost due to shack fires, and how they should keep themselves and the children safe. However, the main objective of these settlement meetings are mainly political. A few (7.74%) respondents said there was no fire warning information disseminated even in meetings, they only talked about the affected people and paying their last respects."*All they care about is being elected, they don't care about us these ANC (African National Congress) guys, they don't care about us at all"*. said one of the respondents who asked to be anonymous.

Only (1.72%) of the respondents said they saw the warning on television. Word of mouth seems to be the best way of disseminating fire warnings as (29.24%) of the respondents said they heard the warning from neighbours or their children. The finding of the study is that fire warnings are fairly disseminated in this community by word of mouth. The problem still remaining is what to do with the warnings as it is clear that after warnings nothing is done. If something was done the community could not have been experiencing the amount of shack fires documented by the Mangaung fire department division. A gap between fire awareness campaigns and fire warnings should be bridged to combat these fires.

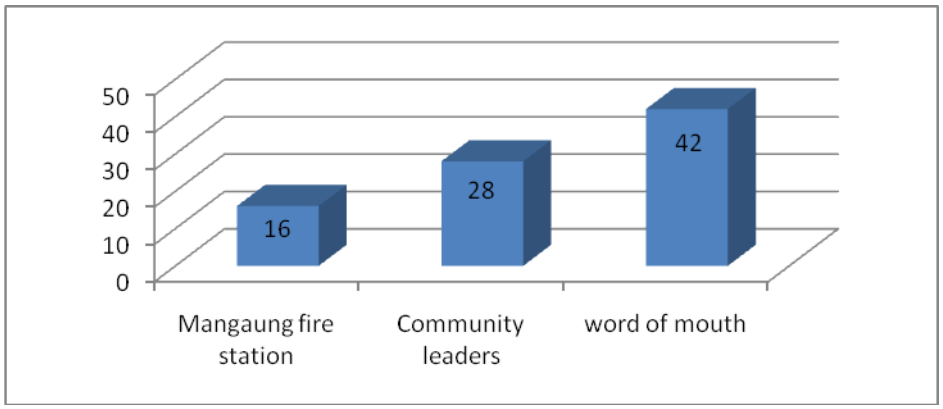


Figure 3.20:Showing who issues early warning information

According to Figure 3.19, people are the main disseminators of early warning information as (36.12%) of the respondents said they received their warning information from their friends, neighbours and even school children. The Mangaung fire station managed to reach (13.8%) of the respondents as they reported getting their warnings from the station while community leaders seemed to have reached (24.1%) of the respondents. The study implies that early warning systems are disseminated across the community by various means. It is lack of knowledge of what to do with the warnings after receiving them that poses a problem. Education can play a vital role in this application and commitment of relevant government departments is needed in this regard.

Table 3.8: Showing whether people trust information disseminator

Information Disseminated Trustworthy	Frequency	Percentage
Yes	30	37.0%
No	51	62.9%
Total	81	94.1%

This question was meant to establish the trust of the respondents in their sources of information and as seen in Table 3.9, the distribution varies greatly. There was (5.9%) who did not want to comment as they said trust was a big issue even within the community. Of the respondents (62.9%) said they did not trust the information disseminated, whereas (37.0%) of the respondents

said they trusted the early warning information disseminated. Most respondents were quick to say that even if they trusted the information they usually did not act on it. This supports the previous question about information dissemination. According to figure 3.19, early warning information is fairly if not adequately disseminated, but the Mangaung fire station is still receiving most of its fire calls from the very same community that has various early warning sources.

The study finding is that mistrust is disabling the people of J.B. Mafora not to act on the warnings received; hence lots of shack fires are reported. The implication of the study is that there should be a good relationship between the Mangaung fire station, community leaders and the people of J.B. Mafora in order to instil that element of trust. Fire awareness campaigns by the fire department should be put in place for the benefit of this community and to reduce the number of fires reported especially in winter.

Table 3.9: Showing frequency and percentage of trust of early warning information dissemination

If not, why?	Frequency	Percentage
Similar warning issued before but no fire outbreak	36	75%
Lived in the area for long, hence know better	12	25%
Total	48	55.8%

The frequency and percentage distribution Table 3.10 shows that (75%) of the respondents did not trust the information disseminated, mainly because experience had taught them not to. They claimed to have their own coping strategies as individuals and (25%) of the respondents reported that they knew better as far as the fires were concerned. The (44.2%) of the respondents who answered yes to Question 32 said they trusted the information disseminated, but still they did nothing about the warning. From the number of shack fires that are affecting this area it is evident.

Table 3.10: Frequency and percentage distribution to show compliance to mitigation measures issued by the authority

Compliance With The Directives	Frequency	Percentage
Yes	10	11.9%
No	74	88%
Total	84	99.9%

A minority (0.1%) of the respondents did not attempt this question. Even though (88%) did not comply with the directives as opposed to the (11.9%), evidence was still not shown. Reports reflected 30 houses burnt down in this area in 2009 Mangaung Fire Station reports, (2009). The (11.9%) of the respondents that said they were complying claimed they had been following the directives correctly. The findings of the study were that there should be a way to monitor how the people of J.B. Mafora were complying with the directives from the authorities. If after monitoring, there were still fire outbreaks the directives should be re-evaluated to find out if they were aimed at mitigating these fires. At times the directives can be applied wrongly by the community due to lack of training or unforeseen factors.

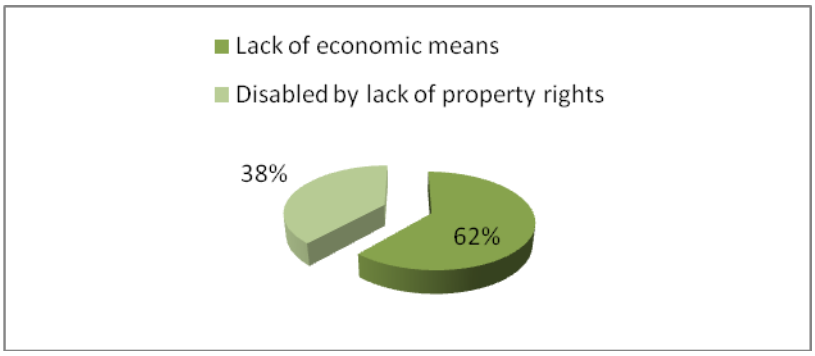


Figure 3.21: Showing compliance with the directives of the authority on fire mitigation

Even though compliance with the authorities directives is at (38%) one of the respondents said,"*If you have a no window house like mine how are you going to open a window when you light a parraffin stove or worse how will you run past the burning door if you do not have a window as an alternative escape route*". Of the (38%) who said they did not comply with the

directives of the authorities the main reason for non compliance was lack of funding to build bigger houses using the right materials as well as ensuring adequate ventilation. Of the respondents (62%) blamed lack of brick structures as the barrier.

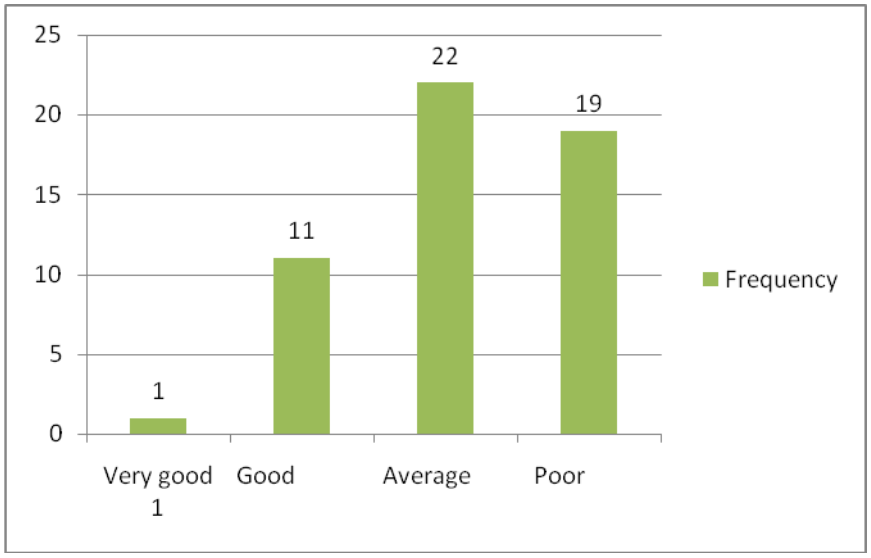


Figure 3.22:Frequency distribution showing level of assisstance

This question required the respondents to indicate the level of assistance they received during fire outbreaks. Only (0.86%) of the respondents rated the level of assistance they got when their houses burnt down as very good. She is a single woman who stayed in what she called a mini shack. The department of housing provided her with a roof over her head, food parcels and a blanket, and she said she was able to take it from there [see Figure 3.22]. There were (18.9%) of the respondents that regarded the level of assistance as average, and everyone said they were only assisted with building materials and labour. Of the respondents (16.3%) regarded the level of assistance as poor as most of them said the government could do better than a roof over their heads. Some,(28.4%) of the respondents did not attempt this question as they said they had never received any assisstance, because they never experienced fires in their houses. The study results indicated there was not enough assisstance offered to the community.

Research findings showed that the community needed more assisstance to help them cope with the aftermath of these fires. The assisstance given to the community need to be reviewed by the local government**.**

Figure 3.23: Picture taken from department of housing galleries: Free State province

3.7 Section 4: Access to the house by fire fighting vehicles

The aim of this section is to establish how far the houses of respondents were from the main road and whether the type of road was accessible to motor vehicles and fire engines; this would answer and clarify why (90%) of the community lost everything in the fires that ravaged their homes. It is imperative to know the state of the roads so that mitigation measures can be put in place as far as accessibility of the houses is concerned for easy access to the burning households.

Table 3.11: Showing distribution of institution to be notified first during fire out breaks.

Institution	Frequency	Percentage
Fire brigade	39	45.30%
Police	38	44.20%
Settlement committee	9	10.40%
Total	86	100%

According to Table 3.11 (45%) of the respondents would inform the fire brigade first during fires as opposed to (44.2%) who would inform the police while nine per cent said they would inform the settlement committee. The study established that there was a relationship between the Mangaung fire station and this community. Judging from the percentages one can conclude that it was probably because of the fires that are frequenting their area.

Table 3.12 Showing distribution of accessibility of houses by fire vehicles

fire vehicle access to house	Frequency	Percentage
Yes	20	23.2%
No	66	76.7%
Total	86	100.00%

This question was aimed at finding out how far the access point of fire engines to respondents' houses was. Table 3.13 indicates that. (76%) said the fire engines could not access their houses, because of poor road structure and again because the houses were so close together with little space in between. The study concluded that the difficulty of the fire vehicles to access the houses might be one of the other reasons why in fire incidences many of the affected lost their entire belongings. A few (20%) of the respondents said the fire engine could access their houses as most of these respondents were on the main road.

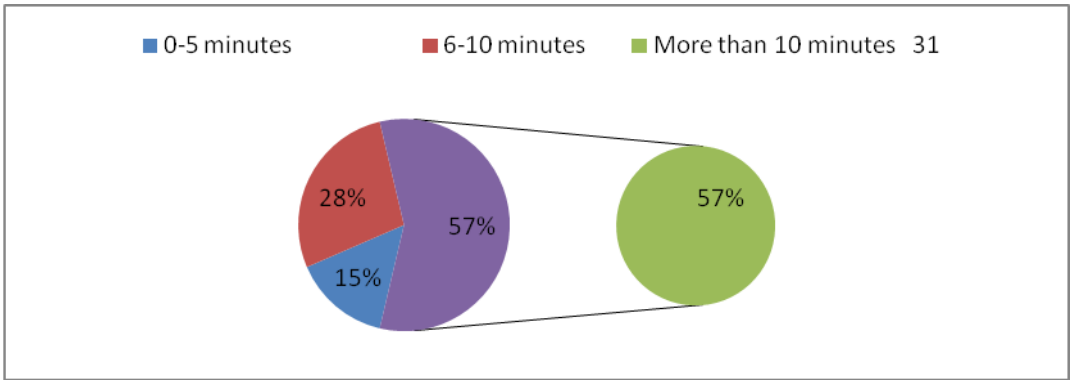
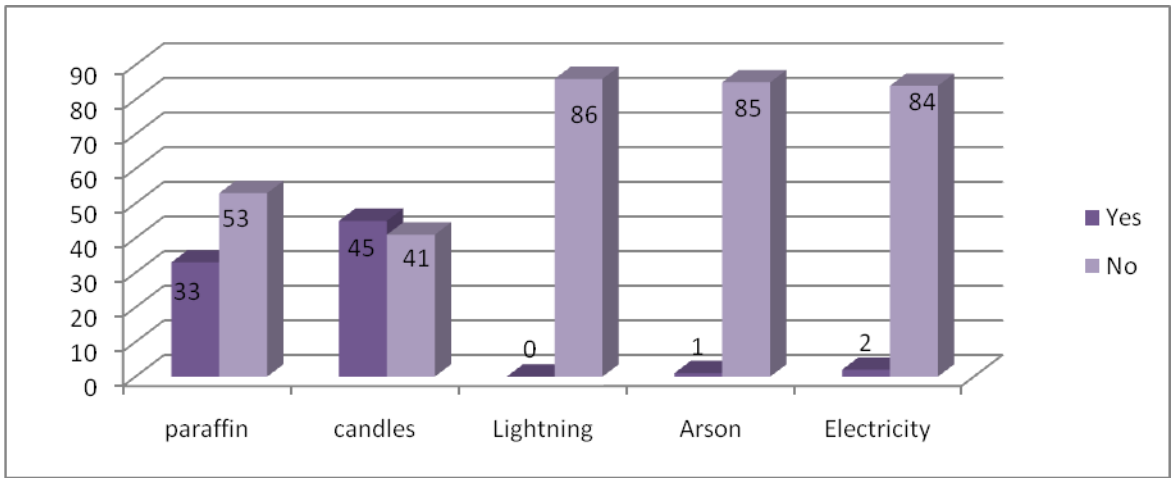


Figure 3.24: Showing how far the access point of the fire vehicles in minutes

The respondents were asked to specify how many minutes it would take a fire vehicle to access their houses. That was asked in order to determine whether response time contributed to escalating the impact of these fires. According to (57%) of the respondents it took more than ten minutes. Research findings and observations found that the roads in the community were not meant for vehicles at all, not tarred, had lots of dongas as it was even difficult for people walking to access their neighbours' houses. Observation showed that there was a huge wide river like a donga that was dry most part of the year. It was too deep even for people to cross. The implication of this is that during fires it will always be difficult for fire vehicles to access most houses therefore the number of people dying and losing all their belongings in fires will continue to rise unless the department of roads takes charge.

3.3 Elaboration of questions and general comments

This section dealt with the general comments of the community that were not captured by the questionnaire, as most respondents were willing to give more information about the fires. The need for general recommendations and elaboration on questions arised to add more information. This in particular made data collection interesting and enabled the researcher to better understand the community.



Figures 3.25: showing fire experienced with regards to the other sources of ignition

Question 20 asked respondents if they had experienced fires in their area which led to questions 21, 22, 23, 24 and 25 of the questionnaire. The respondents were supposed to elaborate on the cause of the fire they experienced. Few sources were given to the respondents to elaborate on; paraffin, candles, lightning, arson and electricity. Of the five sources given candles top the list as the main cause of fire ignition in this area according to 45 respondents. Some respondents (28.4%) said paraffin was the source of ignition, whereas three respondents said electricity, and one respondent said arson. Lightning had never been an issue in this area as far as fire ignition was concerned.

The finding of the study was that candles were the main source of fire ignition in this area; even the Mangaung fire station concurred by their 2009 fire reports. The reports continued to elaborate that many people in that area died inside their shacks because they used a chain padlock system for security. It is only the person inside who could open the padlock quickly and easily. In case of fires the smoke can made the person inside drowsy who could then found it difficult to access the padlock in time until, in most cases, they burnt to death before help arrive. Study observation has shown that most houses were indeed using the padlock chain system for locking their doors and most chains were very strong. It was also observed that due to the high poverty experienced in this area, theft was rife. Hence the use of thick chains to make it difficult for thieves to break them.

Table 3.13: Frequency and percentage distribution of assistance during fire outbreaks

Enough Assistance During Fire Outbreaks	Frequency	Percentage
Yes	21	24.4%
No	56	65.10%
Total	77	89.50%

According to the percentage distribution in Table 3.14, (10.4%) of the respondents did not attempt the question. Some respondents who never experienced shack fires felt obliged to answer the question based on the assistance given to their neighbours. Of the respondent,(65.1%) said the kind of assistance they received during fire outbreaks was not enough, they expected the local government to enable them to resume their normal life as per the provision of the disaster management Act of South Africa, 2002, The Declaration of local state of a disaster states, "*Other steps that may be necessary to prevent an escalation of the disaster, or to alleviate, contain and minimize the effects of the disaster should be taken*".

The implication of this section when applied to the study area according to the respondents and assistance they receive was that not enough is done during shack fire response in that community. The study findings are that when this community is affected by fires more than (90%) of them lost all their possessions due to the size of their household as established in section 1.

Assisting them with only a structure is not enough as most respondents said after most fires they are able to erect their own shack as quickly as the government could. Lack of furniture, food and blankets were their main worries after fire incidences. Thus (24%) of the respondents said they thought assistance given during and after shack fires was enough. The (65.1%) that said they were not satisfied with the kind of assistance they received during shack fires were expected to elaborate on their answers.

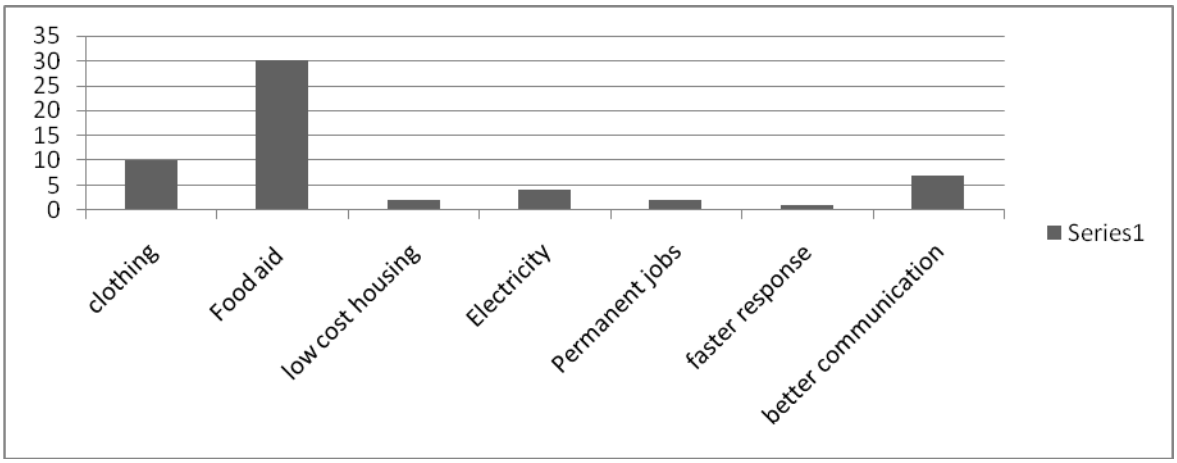


Figure 3.26: Graph showing elaboration of question 37

Figure 3.25 shows (48.2%) of the respondents said they were not satisfied with the assisstance during fires, and 25.8% of the respondents said they would appreciate it if they received food parcels while they were trying to sort out their lives. Others (8.6%) of the respondents said they would rather have clothing after all their clothes had been destroyed in the fires.Low cost housing, electricity, faster response and better communication were some of the issues raised.

The study has shown that hunger is the main issue in this area after shack fires, which leads to the question of food security in this community and opens doors for other research. Even though (1.7%) of the respondents said assistance with low cost housing would be enough for them if affected by fire. it became clear that most respondents who said they would rather be assissted with food instead of housing and everything and they would be all right ,lived in very old, rusty, delapidated houses wich increases their vulnerability to fire.Knowledge of vulnerability,exposure and risk need to be instilled in this community.

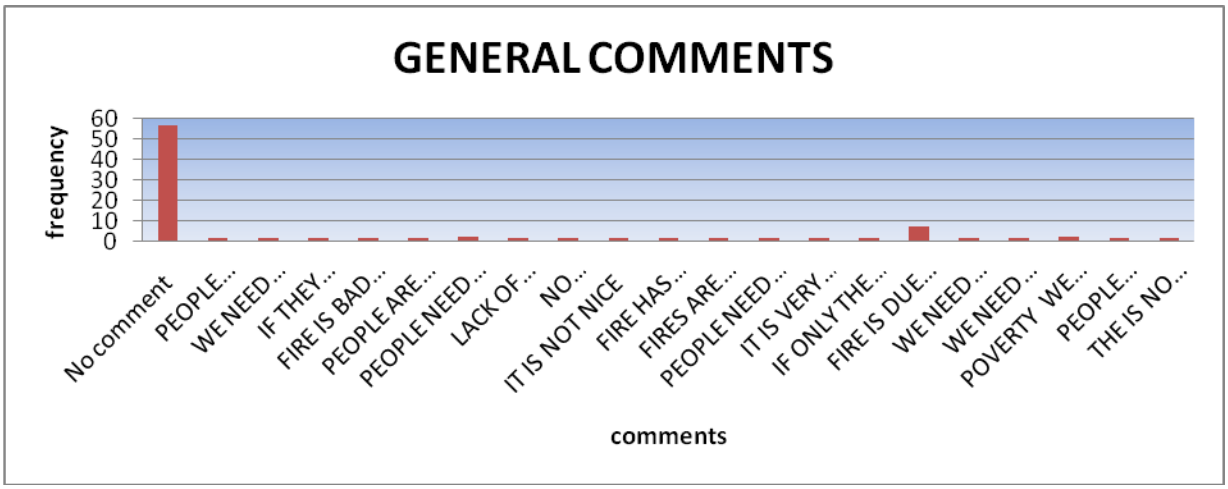


Figure 3.27:General comments of respondents concerning shack fires

This question was asked to establish how the community as represented by the sample size felt about the fires ravishing their area as referred to in previous sections.Of the respondents (49%) decided not to comment whereas six per cent of the respondents said the fires in their area were due to no housing contradictory to elaboration of Question 37 where two respondents felt they needed to be assissted with low cost housing.

General comments of respondents that are not showing in Figure 3.26

Participant 1: "*People should try to assist one another during fires to try to extinguish the fires"*

Participant 4*: "We need a fire station in our area for a speedy response"*

Participant 5*: "Only the fire fighters could try to speed up when they are called"*

Participant 7:"*Fire is bad for us"*

Participant 8:"*People are ignorant when it comes to fires and around fires"*

Participant 10 and 12: *"Lack of electricity is a problem and it should be addressed sooner Rather than later"*

Participant 13: *"It is not nice that our area is affected by so many fires".*

Participant 14: *"Fire has killed me in my heart even now I am still bleeding; I lost a loved one Due to these fires"*

Participant 17: *"Fires are ravaging our community that is a fact that cannot be ignored"*

Participant 23: *"People need to be careful, alcohol; leaving children alone contribute a lot to This fires"*

Participant 29*: "If only the fire brigade can be fast while we try help extinguish the fires"*

Participant 54: *"We need assistance now that it is winter we are going to burn"*

Participant 68: *"We need assistance when it comes to this fire"*

Participant 70: *"There is no community spirit, lot of hate that is why we do not help each other"*

Participant 77: *"We should be provided at least with (RDP) government low cost housing and Food parcels post fire events"*

3.4 Primary data analysis by application of vulnerability equation

Development (DFID) of England's Villagran (2006) provided a formula that encompassed the parameters of vulnerability. Data collected established that the majority of the respondents had their household made of zinc sheets and it was established that zinc sheet is highly flammable. Observation showed that most respondent's houses were rusted, and rusted zinc is quicker to burn than new iron as there is more oxygen in the rusted iron as compared to new zinc. Oxygen is scientifically proven to be highly combustible. The study renders the community very susceptible to fires as far as material used for their houses is concerned.

The study has shown a lot of exposure to smoke during shack fires as most houses were not adequately ventilated. Using padlock chain systems for locking doors as the study findings showed was exposing the respondent to burns and smoke inhalation which in some cases resulted in death. Exposure to the impact of fires in this community was addressed by the questionnaire as it touched the exposure to the hazard by showing that the main source of heating in this community was paraffin. It has been scientifically proven that paraffin is highly flammable.

On elaboration of question 37 respondents showed that the coping capacity of this community was low as some of the respondents said if only they could be provided with food aid, after the fire. Study revealed that it seemed that they could not look beyond their empty stomach which is contradictory to the seven out of 15 respondents on the general comments who said that housing was the main reason why they were experiencing a lot of fires in their area. Applying the DFID formula encompasses the parameters of vulnerability as follows:

$$Vulnerability = \frac{Exposure \times Susceptibility}{Coping\ Capacity}$$

The study findings have shown no coping capacity at all in this community, rendering the community highly exposed and highly susceptible to these fires. Applying the equation to the study to find out vulnerability the results is as follows:

$$Vulnerability = \frac{High \times High}{None}$$

$$Therefore\ Vulnerability = High$$

Study showed that vulnerability based on the findings is very high as it is a function of exposure, susceptibility and coping capacity, it shows that this community is more vulnerable to fires.

3.5 Conclusion

This chapter represents the first exploration of the knowledge, practice and perceived risk of shack fires amongst a sizeable sample of low-income individuals in the community of J.B. Mafora. The report discovered relatively low levels of safety-related knowledge and even lower level of safety-related practices in the sampled community. The findings emphasize the urgent need for an area specific intervention system that will assist in lowering the prevalence of fire-related incidences, injuries and death. Development and implementation are also emphasized. Communication is also a major stumbling block in managing the fire risks in the community. Opening lines of communication between this community, DMAs and all spheres of government might be one obstacle that needs to be overcome in successfully managing the J.B. Mafora fires to reduce the impact by minimizing the manifest of the hazard and reducing the level of vulnerability.

CHAPTER FOUR

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

4.1 Introduction

This chapter presents the summary, conclusion and recommendations of the study of the social impact of shack fires on the people of J.B. Mafora informal settlement. The study aimed at reaching an understanding of the social impact of these fires on the people, and how to combat them using available resources internally within this community and externally by involving other role players and all spheres of government. The recommendations are based on research orientation, study findings and literature reviewed.

4.2 Summary of the study findings

The summary of the research is an accurate restatement of materials presented in a condensed form to provide the reader with a general perspective. Seaman (1987) notes that a research report is a written or spoken communication that informs the audience about the research findings and procedures with summaries providing the key findings of the study. The summary and conclusions are gleaned from the findings of the study as presented by the sampled community.

This chapter also seeks to tie up all the discussion points made from all the previous chapters. It wraps up the extent to which the objectives have been attained and the conclusions that can be made. On the basis of the findings and conclusions, recommendations are presented to provide stakeholders in disaster management guidelines in managing local disasters, whereas some recommendations are imported from other provinces in South Africa and are intended to be implemented by the investigated community as mitigatory and preventative measures with the involvement of relevant stakeholders.

First and foremost the study showed communication breakdown between the people of J.B. Mafora and the DMAs, the government and other role players. The communication gap identified throughout this study indirectly contributed to the escalating negative impact of shack fires in this community, according to the study. The main objectives of the research itself

explored the true values of the investigation, and resulted in yielding benefits for both the community and the government. The study findings are mainly based on the specific objectives where recommendations will be drawn from. The study found that the most prominent role-players when addressing the problem of informal settlement fires in J.B. Mafora, are the Mangaung fire department and the provincial Mangaung housing department. According to Bridger and Alter (2006) external forces, such as the local government, can have a great impact on community processes. With very little other resources available to the people of J.B. Mafora, they not only turn to the government for building materials, but also as the authority responsible for addressing this problem. This is certainly the case in J.B. Mafora, the community members and respondents in this study see the task of addressing risk and vulnerability related to informal settlement fires as the responsibility of local government.

The above-mentioned mindset was evident throughout the administering of questionnaires in the general lack of interest in the subject of most of the respondents, except those who received assistance from the department of housing. In J.B. Mafora there does not seem to be any driving initiatives from the community at grassroots level. A reliance on the government exists in these communities, where local government is expected to address informal settlement fires when they occur and find a long-term solution. According to Swanepoel and De Beer (2006) reliance is created when local government decides to address a community problem.

4.2.1 Findings based on the study objectives

4.2.1.1 How fire disasters are managed internally

The study findings found that the majority of the people of J.B. Mafora live so far under the breadline, that the researcher was warned not to take her camera and cell phone with while administering the questionnaires by one of the elders. He said, *"Mafora monana go a lapiwa ,motho a ka go bolaela diranta tse Pedi"*, translated into English means people in this community are hungry they can kill you for two rand. Following the cases that were reported to the Rockland police station of random killing in the community in 2010 only, Rockland police reports (2010), so what the old man said did not seem farfetched.

Considering the level of poverty, crime and other pressing issues in this community preparing for fire disasters had proven to be last on the list of priorities in this community. Drawing from the findings of the study a worrisome number of respondents only had a door as an escape route despite the fires that were tormenting and killing people in their community. Of the households visited, eighty-six in total, none of them had two doors leading outside. Preparedness is part of disaster management and by observation it was not evident in the community.

In this community shacks are so close to each other that when one shack burns runaway fire is a high possibility [see Figure 2.7]. No mitigation measures were visible as (88%) of the respondents said they did not comply with the DMAs mitigative directive simply because there was none. Amongst the few respondents that said they were complying, were mostly the people who had once been affected by shack fires, and they had the opportunity to see the DMAs according to the study.

By observation, prevention of sprawling fires seems impossible in the densely built settlement of J.B. Mafora [see Figure 2.7]. The finding of the study shows reconstruction as the only component of disaster management that the government is responsible for in this community. Even though reconstruction goes with rehabilitation according to the disaster management framework of South Africa, 2005, the latter seems to be pushed aside by the Mangaung provincial housing department. All the respondents who lost their houses to fire in this community were provided with building material and labour by the department of housing [See Figure 3.4]. According to the study, the poverty level in this community rises as trying to go back to a normal life with only a roof over your head has proven difficult in this community based on the general comments of most of the respondents.

The study findings found that as far as management of fire disasters in the J.B. Mafora community is concerned, the government acts as a response unit as they are only visible post fire incidents. Externally fires are not properly managed in this community. The people of J.B. Mafora seem clueless about disaster management, and they did not show any interest. Internally it seemed like the people of J.B. Mafora had developed a dependency syndrome whereby they expected the government to do everything after their shack have burnt down.

4.2.1.2 Long-term strategies of risk reduction.

These strategies will bring sustainable solutions and incorporate disaster resilience and mitigation into actions and decisions. The time it takes for assistance to reach the burning shacks increases the impact of these fires. Only 10.4% of the respondents, equivalent to nine people, reported having received assistance from authorities an hour after ignition time. The rest of the respondents reported receiving their assistance a day later or never. Experience has shown that response time influences the impact of a hazard in any given situation. Awareness of disaster management features in the disaster management framework of 2005 as one of the enablers. It is therefore a very important tool for long-term strategies of reducing risks and ensuring sustainability.

Of the respondents (94%) said they were not aware of any campaigns in their area. The study proved that there was a lack of awareness in this community as the majority of the respondents were not aware of any awareness campaigns. Word of mouth seemed to be the viable route for disseminating information in the community. This is because of the unavailability of a community radio station, and the majority are not connected to electricity therefore access to television is limited. The study confirmed only 2% of the respondents received their warning via television. In a community that has a low level of literacy; early warning information should be carefully disseminated. The study findings found that out of 86 respondents, 34 received their fire warning information by word of mouth. Drawing from that, a mode of early warning information dissemination should be devised and be sustainable. The study findings show that good strategies of disseminating information for mitigation are lacking.

4.2.1.3 The perception of the people pertaining to shack fires

Shack fires in this community result in loss of lives in most incidences according to the study. The study investigation stressed the fact that people of this community are more concerned about post fire measures. It has also shown that the people who are most vulnerable are those who leave in one room houses with inadequate ventilation as they tend to die from smoke inhalation. 43% of the respondents live in one room shacks, the investigation went further to discover that of all those respondents 50% have inadequate ventilation; this leaves them susceptible to smoke inhalation. The worst is expected to happen in a household that is inadequately ventilated as 53%

respondents confirmed that they know people who have died due to fire related incidences in their area.

The most disturbing findings was that in post fire incidents the affected are left hungry and dissolute by the government which provide building materials and labour after the fires. Therefore, hunger according to the study findings seems to be the aftershock in this community. (0.86%) of the total respondents which equals one person had the privilege of receiving food parcels from the Mangaung provincial department of housing [see Figure 3.22]. The fact that the majority of the people in this community loose all their belongings to these fires leads to the conclusion that putting food on the table after fire seems to be a challenge. The study has found that these fires that are ravaging these households leave the affected with nothing but the clothes they are wearing in most incidences. Important documents like identity books that the affected will need to claim temporary food grants from social welfare are lost to these fires in most cases.

Following the study, hunger seem to be the most worrisome aftershock, hunger on its own can escalate crime rate of a community. Participant 77 emphasized how the provision of food parcels post fire incidences can make a difference in reducing hunger, he also mentioned lack of housing as escalating the impact of shack fires in their community by increasing the possibility of runaway fires, this view is justified by Figure 2.7: Long view of shack settlements, J.B Mafora.picture taken by the researcher few months before the survey.

4.2.1.4 The level of vulnerability and coping capacity

Most of vulnerability assessment models perfectly link vulnerability with coping capacity stating low coping capacity equals more exposure which increases the vulnerability level of an individual or community. The level of vulnerability of the investigated community was looked at based on their personal profile. Indicators such as gender, marital status, age, level of education and the household size were explored in this study to better understand the vulnerability and the coping capacity of this community.

Women in this community are the most vulnerable when considering the age distribution and gender of the participants, (72%) of the respondents were females between ages thirty six and sixty years of age which qualifies them as women. The issue of women being most vulnerable as

opposed to their men counterparts is explicitly covered in the sphere project whereby women are classed with the vulnerable groups. The women are most vulnerable in that ninety percent of their time is spent at home performing domestic work. The study finding has proven that the women of J.B Mafora are most vulnerable as far as fires are concerned justified by the (72%) of the respondents being women, taking into consideration that the level of exposure is directly proportional to the degree of vulnerability.

By observation and life experience single parenting comes with its financial strains, the strain was obvious in most single parents households visited. Most single parents were women and the majority of them reported using open fires for cooking and heating increasing their vulnerability, even though they have electricity connections in their shacks. Coping with the financial burdens alone is difficult as evidently shown in the single parent household visited during the survey. Again having manpower in the house can reduce the impact of fires as naturally during fire outbreaks women will turn to rescuing their children first, while men will be trying to salvage their belongings. The study has yet again justified the high level of vulnerability of single women of J.B. Mafora to these fires based on marital status. This is attributed to lack of financial support from partners and lack of manpower during fires, justified by the majority of affected respondents being single as reported by (46%) of the respondents.

Household size increases the impact of fire hazards by increasing the number of vulnerable household members; according to the findings of the study (46.6%) of respondents have three to five inhabitants in a two room household. This increases the number of people who are at risk in one household, therefore increasing the level of vulnerability of the community. The study has also found that the majority of the (46%)of respondents with three to five inhabitants most of them share a two room shack with one window for ventilation increasing their vulnerability to smoke inhalation related death and burning to death because of insufficient escape routes. Over crowdedness can increase the level of vulnerability, (6.9%) of the respondents indicated that more than seven people make up their household with either two or three rooms. None of the respondents reported to be staying in a four roomed house. According to the study household size in the community of J.B. Mafora is increasing the vulnerability of individuals in households.

Awareness is ripe amongst educated people naturally. This is due to their inquisitive minds of wanting to read anything they lay their hands on. (22%) of the respondents have junior secondary education, which means the majority of the respondents are high school dropouts. This finding shows that it is difficult for the majority in this community to have formal jobs with good salary to put down structural mitigation measures and it also renders them incapable of applying or understanding non-structural mitigation measures because of their literacy level. The aim of putting down mitigation measures is to reduce the impact of the hazard, reducing vulnerability in the process. Literacy level of the people of J.B. Mafora renders them vulnerable to the fires ravaging their area every winter.

According to the study every respondent knew about somebody who has been affected by shack fires or they were the ones affected by the fires. Of all the causes of ignition candle tops the list, this according to (58.1%) respondents, followed by (25%) who said paraffin. This is mainly because the majority of the households have no electricity in this settlement and therefore they use candles and paraffin a lot, increasing their exposure and vulnerabilities. The study found out that organisation such as working on fire (WoF) or Paraffin Safety Association of Southern Africa (PASASA) has not as yet reached the impoverished people of this community based on the (96%) of the respondents who said they are not aware of any awareness campaigns in their area. (57%) of the respondents used iron sheets to build their shack of which iron is highly flammable and burns easily. This indicates the extent of the vulnerability of this people afforded by the type of building material they used to build their structure. The study has found out that this can be the main reason why most lives are lost during these fires and why in most incidences reported people either die or all their belongings are lost Mangaung, fire reports, (2009).

4.3 Summary of study findings based on secondary data

Secondary data obtained from the census 2001 has shown that people of J.B Mafora informal settlement are falling under the low income communities of South Africa. Burn death and injuries are common in people of lower socio-economic status like this community and survivors find their poverty levels worsen post fires. These findings showcase the negative economic impact of fires on the investigated community. The study has shown that (63%) [See Figure 3.11] of the respondents leave above five kilometres from the nearest health care centre and the

majority of the population do not own vehicles by study observation. According to the Mangaung fire reports (2009) and the study findings, candle is the major cause of fires in this community and the study as well as literature reviewed has proven it.

4.4 Recommendations

Based on the findings above, that reflect the negative impact of fires that ravage the people of J.B. Mafora every winter the following recommendations can be made:

4.4.1 Preparedness

Preparedness is necessary for disaster prevention and mitigation as it increases the capacity of communities and households to minimise the risk and impact of disasters. The local government should help this community to prepare for fires by tasking the engineers with the role of making trenches before winter that will act as fire breaks to prevent runaway fires. The private and public sectors should take advantage of the new proclaimed metropolitan Mangaung Municipality by establishing building projects that will develop this community by building low cost housing. This will contribute towards the revival of the economy of this community by creating job opportunities for locals, small businesses like painting of low cost housing, putting burglar windows and doors, and tiling on these low cost housing will start to thrive, enabling this community to progress to safety. This will increase the coping capacity of these people by increasing income level such that they will be able to prepare for and mitigate fire hazards.

4.4.2 Reconstruction and Rehabilitation

In disasters that are happening globally, there are always aftershocks or calamities, for example the 2011, Japan Miyagi earthquake disaster, which aftershocks were nuclear plant bombings, and South Africa television channels news bulletins (03/2011). J.B. Mafora shack fire disasters have proven no different, after the fires the affected are left hungry as the study has shown that hunger is the aftershock of these fires. The study recommends food parcel provision to the affected to combat the hunger accompanied by the fires, the study reported only one respondent receiving food parcels with shack material from the department of housing.

4.4.3 Awareness

Considering the literacy level in this community, awareness campaigns should be carried out in a manner that everybody will be interested, if pamphlets are used they should be written in local language and they must be pictorial to accommodate the majority who cannot read. The mode of early warning information dissemination should be by the use of loud hailers, as they tend to reach large audiences and they are also known for drawing attention in communities.

4.4.4 Level of education

To improve the level of education adult basic education centres should be built nearer to the community since most of the schools are concentrated in the city centre to encourage interest of the community in finishing their schooling so that they can be afforded job opportunities in formal sectors. Most of the respondents were reported to be high school dropouts. The level of education of this community was proven by the findings of this study as one of the indicators to measure vulnerability and it was found to be high in this regard**.**

4.4.5 Dependency syndrome

The local government's role in disaster management, is supposed to be facilitators rather than relief agents. One critique that has been made against the way in which the local government facilitation of participation has been implemented applies to this study. Bridger and Luloff (1999) argue that policies and programs that are designed to include and conform to community norms and desires are formulated outside the community, and therefore there is still often little regard for local circumstances with limited participation of community members in decision-making. The study has found that community members, especially those affected are not engaged in decision-making. It is therefore very important that the official does not regard and treat the community members and affected only as receivers or non-receivers of services, or as targets of beneficiaries as this could exacerbate the unbalanced relationship between the government and community members.Swanepoel and De Beer (2006). The department of Housing should let the affected build their own shack after they have provided building materials.

4.4.6 Community

For the community the following are recommended, Smoke detectors as they can be of much assistance if the people can afford them. Having them installed in the kitchen and bedrooms, will assist in early fire detection, a business opportunity should be looked at by local businesses in Mangaung in this regard. At least two escape routes for each house, most of the respondents had only one door, some do not even have a window as an alternative escape route. The study has shown that candle is the major cause of death in fire incidences in J.B Mafora; the community should ensure that candles are placed correctly into candle holders, and make sure that open flames from candles are not close to curtains, the bed or other flammable materials. All family members should know the emergency number by head. While some of these recommendations may be common knowledge the researcher believes they will reduce the impact of fire hazards in the investigated area if implemented.

4.5 Conclusions

Various conclusions are drawn from the findings of this study. Since the study investigated the impact of shack fires on the people of J.B. Mafora, the findings proved that the impact is negative. People lose their lives; livelihoods are disrupted due to documents lost to fire, and people's belongings are being destroyed by these fires. Hunger becomes a calamity after the fire. Urgent measures to facilitate coordination between disaster management role players and the Mangaung fire department with this community are necessary to alleviate the suffering in this community. Disaster Management Act of South Africa encourages coordination for risk reduction and for minimizing the impact of a hazard. The government should play the central role in addressing the issue of informal settlement fires as per provision of disaster management South Africa, (2002). Only through real interest, participation and motivation from all parties involved who will actively address informal settlement fires and issues surrounding them will this hazard be minimized in communities. At this stage stronger relationships need to be established between different role players, and awareness to the fact that preventative measures can be taken to mitigate the impact of Informal settlement fires.

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Appendices

Appendix 1

Household questionnaire

Date of completion: ……. 2011

Questionnaire for the people of J.B Mafora on the impact of shack fires

I am currently undertaking a master's degree at the University of the Free State, Bloemfontein doing research on the impact of shack fires in your community. I have chosen your community as my area of study because according to the Mangaung fire department reports, J.B Mafora informal settlement has experienced and still is experiencing a vast amount of shack fires and more especially in winter. That is why I felt the need for researching these fires in your area.

I have designed this questionnaire in order to complete my research project which is part of the university requirements. The questionnaire is aimed at understanding the effects of these fires in your community. Through this study, I hope to contribute on whether shack fires in your area can be effectively controlled and adequately prepared for. You are therefore requested to answer all the questions as truthfully as possible. Indicate your choice with an "X" and also put your answers in the boxes provided. You are also expected to add your comments in the spaces provided. The information collected will be used for academic purposes, no identification is requested from you and your responses are confidential

Section 1: Household Demographics

1. Gender

1	Male	
2	Female	

2. Marital status

1	Married	
2	Divorced	
3	Widow/widower	
4	Single	

3. Age

1	18 and below	
2	19 - 25	
3	26- 35	
4	36-45	
5	46- 55	
6	56 -60	
7	Over 60	

4. Indicate the highest level of education

1	No schooling	
2	Lower primary (grade 1-4)	
3	Upper primary (grade 5-7)	
4	Junior Secondary (grade 8-10)	
5	Senior Secondary (grade 11-12)	
6	High education (college, technikon, university)	

5. What is the size of the household?

1	2 or less inhabitants	
2	3 to 5 inhabitants	
3	5 to 7 inhabitants	
4	More than 7 inhabitants	

Section 2: Socio-economic section

6. Who is the breadwinner in the family?

1	Mother	
2	Father	
3	Other (specify)	

7. Household monthly income

1	No income	
2	No fixed income	
3	Below R 500	
4	R500 – R1000	
5	R1001 – R2000	
6	R2001 – R3000	
7	Above R3000	

8. How big is your house/ structure?

1	1 room	
2	2 rooms	
3	3 rooms	
4	Above 3 rooms	

9. Is your house adequately ventilated?

Yes	
No	

10. What type of ventilation does your house/ structure have?

1	Door only	
2	Windows only	
3	Both door and widows	
4	Other(specify)	

11. What type of material did you use for your house/ structure?

1	Iron Sheets	
2	Bricks	
3	Wood planks	

12. What is the ownership of this house/ structure?

1	Own house / structure	
2	Tenant	
3	Other (specify)	

13. How many years have you been living in this same house/structure?

1	Less than a year	
2	1-2 years	
3	3-4 years	
4	Above 4 years	

14. How far is the nearest health care facility available to you?

1	Half a kilometre or less	
2	1-2 kilometres	
3	3-5 kilometres	
4	Above 5 kilometres	

Section 3: Exposure to the hazard (fire)

15. What is your main source of power for cooking?

1	Fire-wood	
2	Gas	
3	Paraffin	
4	Electricity	
5	Other (specify)	

16. What is your main source of power for heating?

1	Fire-wood	
2	Gas	
3	Paraffin	
4	Electricity	

17. Do you know anyone in your area that has been affected by fires?

1	Yes	
2	No	

18. Do you know anyone who has died in fire related incidences in your area?

1	Yes	
2	No	

19. If yes what was the cause?

1	Fire-wood	
2	Gas	
3	Paraffin	
4	Electricity	
5	Other (specify)	

Elaborate……

20. Have you experienced fire in your household or area?

1	Yes	
2	No	

Have you been affected by fire in relation to the following?

		Yes	No
21	Paraffin		
22	Candles		
23	Lightning		
24	Electricity		

Section 4: Organizational arrangements

26. Do you get any assistance from the government or disaster management authority or any non-governmental organization, during or after fire disaster incidences in your area?

1	Yes	
2	No	

27. How soon do people usually get these kinds of assistance in case of fire in your area?

1	Within hours	
2	After a day	
3	Within a week	
4	After a month	

28. Is there a settlement fire committee in your area?

1	Yes	
2	No	

29. Is there community public awareness campaigns on fire in J.B.Mafora?

1	Yes	
2	No	

30. How are fire warning information mainly disseminated in J.B Mafora?

1	Word of mouth	
2	Radio	
3	TV	
4	Settlement meetings	
5	None	

31. Who issues the early warning information?

1	Mangaung fire station	
2	Community leaders	
3	Others (specify) _____	

32. Do you trust the information disseminated?

1	Yes	
2	No	

33. If not, why?

1	Similar warning issued before but no fire outbreak	
2	Lived in the area for long, hence know better	
3	Other (specify) _____	

34. Do you comply with the directives issued by the authority to mitigate fire risks?

1	Yes	
2	No	

35. If not, why?

1	Lack of economic means	
2	Disabled by lack of property rights	
3	Other (specify) _____	

36. If you have received assistance during fire outbreaks please rate the level of assistance that you got

1	Very good	
2	Good	
3	Average	
4	Poor	

37. Do you think that the kind of assistance that you get during fires outbreaks is enough?

1	Yes	
2	No	

If no, elaborate

……

Section 4: Accesses to the house by fire fighting vehicles

38. If the fire breaks out, which institution do you inform first?

1	Fire brigade	
2	Police	
3	Settlement committee	
4	Others (specify)	

39. Can a fire fighting vehicle access your house?

1	Yes	
2	No	

40. If yes how far is the access point?

Distance in minutes walk		
1	0-5	
2	6-10	
3	More than 10	

41. What is your general comment considering the shack fires your community experience?

Thank you very much for your assistance in completing this questionnaire.

Appendix 2

Photos of J.B Mafora informal settlement

Burnt house and remains on the day of interviews

Remains of the shack where a toddler died

Typical shacks at J.B Mafora settlement with no ventilation or one ventilation