

## ASSESSMENT OF FIRE SAFETY PREPAREDNESS AT JOMO KENYATTA INTERNATIONAL AIRPORT

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### Abstract

Recently, Kenyans have witnessed an increase in incidents of fire where fire has gutting down homes, buildings and factories, with loss of lives and property. Lack of disaster preparedness has remained one of Kenya's enduring development challenges for decades. There is lack of recognition of the interrelationship between disaster preparedness, unsustainable production and consumption patterns. Most of the fire disaster response initiatives in Kenya tend to be *ad hoc*, uncoordinated and short-term measures, mainly in the form of emergency relief services to the worst affected areas. Fire outbreaks are not only a health risk, but they also adversely affect the social, economic and environmental conditions of an organization. The purpose of this study was to assess fire safety preparedness measures in place at Jomo Kenyatta International Airport based on International Civil Aviation Organization (ICAO) standards. The study employed descriptive research design targeting 340 respondents using proportional random sampling technique. A questionnaire was used in collecting data. Based on the results of the study, Jomo Kenyatta International Airport has inadequate preventive and preparedness measures in place to minimize the potential effects of any fire disaster occurrence. It lacks mechanism to integrate the safety standards and practices of the different stakeholders in and around the airport. The study recommends an integrated fire disaster management system involving all organizations operating at the airport and a provision for more and bigger emergency exits and a public address system that can be relied upon in case of a fire disaster.

**Key words:** Fire safety, preparedness, awareness, compliance, policies safety standards

## 1.0 Introduction

### 1.1 Background of the Study

Fire is the byproduct of a chemical reaction in which heat stored in a combustible fuel is converted to a gas. A fire's flame refers to the visual indication of light that occurs once the gas is heated, and is evidence that a fire has taken place (Tonui, 2009). Fire has been identified as the greatest challenge to the safety of not only the industrial plants but in all workplaces in Kenya (Kelvin, 2003). A fire can result in extensive damage and destruction of property as well as injuries to occupants of a given premises. Even when fires don't injure workers, they can disrupt activities quite significantly and bring most operations to a standstill. Fires can lead to the destruction of property and loss of important records and information hence the need for clear fire safety rules to minimize outbreaks and the loss that can result from such hazards (Schifiliti, 2003).

Fire safety measures include those that are planned during the construction of a building or implemented in structures that are already standing, and those that are taught to occupants of the building. Fire safety system need to be considered as an inherent part of the building design and not as supplementary to others matters such as ergonomics, services or finishes (Schifiliti, 2003). Fire safety service is an important element of any development as people's lives, properties and investments are put at risk in the event of fire outbreaks. The main objective of fire safety efforts is to protect occupants from injury and to prevent loss of life or injuries. The second goal of fire safety is to prevent property damage. Fire safety systems protect lives, limit damage to property and ensure limited interruption to all operations in the work environment. By preventing fires and limiting damage we can ensure that work operations will continue uninterrupted (Drysdale, 1985).

Recent disaster profiles in Kenya indicate many incidents of fire, which have occasioned great loss of resources and human suffering. It is envisaged that in future, fire disasters may increase in terms of frequency, complexity, scope and destructive capacity, (GoK, 2007). Fire disasters may arise from natural causes such as (lightning, volcanic eruptions and some human activities), negligence, civil disorder, accidents and enemy action (Gitau, 2006). The firefighting service provision in Kenya today is grossly inadequate. It operates within a system of meager resources and inadequate training, which does not equip it to sufficiently respond effectively and efficiently to the needs of communities in event of fire outbreaks (Gitau, 2006).

Airports differ in complexity, but each has unique features. Some are small, uncomplicated facilities serving rural environments, while others represent a good sized community complete with residential, industrial, and commercial installations serving major metropolitan areas. Airports are operated by the local government such as a city or county; or by an Authority representing multiple local governments;

while some are operated by the State. However, one thing they all have in common is that they are all subject to emergencies and incidents. Jomo Kenyatta International Airport, formerly called Embakasi Airport and Nairobi International Airport, is Kenya's largest aviation facility, and the busiest airport in East and Central Africa, handling over four million passengers yearly. It is served by runway 06/24. Runway 06 is Instrument Landing System (ILS)-equipped, and is 4 117m long by 45 m wide and is used for take-offs and landings (Kenya Advisor, 2010). JKIA is located approximately 20km to the southeast of the Central Business District of Nairobi City within the geographical coordinates 1° 18' 0" South, 36° 55' 0" East.

The Kenya Airport Authority manages and provides a coordinated system of airports in the country, and establishes emergency plans for different airports including JKIA to conform to Kenya Civil Aviation (Aerodrome Regulations) of 2008 and the Kenya Civil Aviation manual of aerodromes standards, and incorporates the Kenya National State Safety Programme. The objective of airport emergency plan is to minimize the effects of any emergency occurring within the aerodromes (8km radius – full response area), by providing a framework that shall direct and unify actions of all responding agencies to achieve effectiveness and efficiency in respect to saving lives, reducing damage to property and facilities and returning airports to normal operations (Kenya Advisor, 2010).

Aviation industry is guided by the International Civil Aviation Organization (ICAO) which has developed guidelines relating to a variety of areas such as airports, aircraft worthiness, accident investigation, and safety and security. ICAO standards recommend that a system of preventive maintenance of rescue and fire fighting vehicles should be employed to ensure effectiveness of the equipment and compliance with the specified response time throughout the life of the vehicle. Airport emergency exercises/drills in accordance with the requirements stipulated in ICAO Section 9.12 should be conducted at intervals not exceeding two (2) years. The purpose of a full-scale exercise is to ensure the adequacy of the plan to cope with different types of emergencies. It is in the view of such mandate and maintenance of standards that this study is being carried out to evaluate fire safety preparedness at JKIA.

## **1.2 Statement of the Problem**

In recent years, incidents of fire have increased tremendously and become a national concern in Kenyan Airports (Obwaya, 2010). This has led to loss of lives, life threatening injuries, loss of business and investment opportunities, with serious consequences in Kenyan airports. Increase in the number of flights in Kenyan airports and the increasing growth in passenger numbers in these facilities and in the surrounding residential areas is posing new challenges to airports management and operations in terms of fire safety preparedness.

The fact that Airport fires do not only affect the occupier and employees but the general public, who include the vulnerable groups such as the elderly, children contractors, tenants and the disabled means that it is essential to prepare for emergencies that face an airport in order to be able to respond quickly, efficiently and effectively (Ayres, 2009). Owing to the nature of airport operations, airport terminal buildings are generally atrium designed. As such buildings are large and spacious; any fire outbreak can spread rapidly. This, coupled with the high number of passengers commuting through the airport daily, places airport buildings in the high fire load category. This study therefore aimed at assessing the level of fire safety preparedness at Jomo Kenyatta International Airport.

### **Objectives of the Study**

The objectives of the study were:

- (i) To establish the fire safety awareness of the airport workers.
- (ii) To evaluate the fire safety measures that have been put in place to minimize the potential effects of fire tragedy at JKIA.

### **2.0 Literature Review**

Airports handle many passengers and visitors. When there is a fire, it is characterized by a large number of people at risk. Frequent users e.g. staffs are expected to recognize the nearest escape route easily and evacuate. However, the infrequent users such as passengers and visitors might have difficulties in locating the escape routes as they are unfamiliar with the building (British standards Institution, 1997). Braithwaite (2001) in his article 'Aviation Rescue and fire fighting' in Australia noted that to reduce the level of Airport Rescue and Fire Fighting (ARFF) coverage at airports in Australia was a step in the wrong direction, given that the aims of the industry in terms of safety was to reduce accident rates. Braithwaite presents a case for the need to ensure that passengers, regardless of their airport of choice, are provided with an optimum level of ARFF coverage in the event of an accident.

Cooke (1999) also examined the issue of rescue and fire coverage at airports particularly in the UK and the USA. In his thesis, Cooke presented arguments for raising the standards of fire and rescue services, particularly at the larger and busiest airports in the aforementioned countries. Obwaya (2010) in his thesis on disaster preparedness at Jomo Kenyatta International Airport noted that the airport has inadequate fire/emergency escapes routes and few trained personnel in firefighting. Some safety equipment are under serviced, for example fire extinguishers and the equipment are inadequate compared to the number of people.

The researcher also noted the lack of mechanisms to integrate the safety standards and practices of the different stakeholders in and around the airport which has a detrimental effect on safety. He recommended a need to have an integrated disaster management system involving all organizations operating at the airport and

a provision for more and bigger emergency exits and a public address system that can be relied upon in case of a disaster.

Weir (1999) also looked at the issue of fire in aircraft accidents and advocated the need to ensure that safety precautions and safety research are assiduously carried out. Much of his writing in 'The Tombstone Imperative – the Truth about Air Safety' focused on the roles that airlines and the regulators can play in the provision of a relatively safe air transport industry.

Various authors on fire safety at the airports have stressed the need for an adequate level of rescue and fire coverage. These works also recognized that cost was a factor in an airport's ability to provide certain levels of standards. The effects of fire on aircraft as well as the types of injuries and the level of fatalities associated with aircraft accidents are well documented. Much research has gone into evacuation of passengers from burning aircraft and realistic response times that are required in order to minimize the level of harm to passengers and crew in addition to the number of fatalities. Obwaya (2010) in his thesis on disaster preparedness examines how well the Jomo Kenyatta International Airport (JKIA) is prepared to handle an airport disaster in the event that one occurs. In particular he analyzed aircraft fires and terrorist attacks where little work has been done on fire safety preparedness in airports.

### **3.0 Materials and Methods**

#### **3.1 Research Design**

The study utilized descriptive research design because it is a fact-finding mission. Descriptive research is suitable when one studies things as they are in the field without manipulating variables and also gives views and feelings from the respondents regarding issues like where, how and whom. Both qualitative and quantitative data was collected and used. Both primary and secondary information was used to collect data on fire safety preparedness at JKIA.

#### **3.2 Target Population**

The study targeted some of the government agencies and cleaning contractors within JKIA who included employees from Kenya Airport Authority, Immigration, Kenya Airport Police, Kenya Civil Aviation Authority, port health and cleaning contractors among others. The target population was 1850. The sample size for study was 318 with an addition 5% allowed for attrition thus giving 340 which formed 18.4% of the total population.

#### **3.3 Data Collection**

The study collected both primary and secondary data. Primary data were collected using survey questionnaires, although interviews and observations were also employed as necessary. Secondary data sources included Airport fire safety records

and fire safety manuals addressing the objectives of this study. To effectively represent JKIA fire safety status, stratified random sampling was used where the population was classified into groups according to various organizations as shown in Table 1. Respondents of each group were selected randomly. The study targeted a sample size of 340 respondents in which 299 completely filled the questionnaires making a response rate of 87.9%. In total there were more male respondents with a prevalence of 61.5% of the sample than female respondents who formed 38.5% of the sample.

*Table 8: Sample size distribution*

Organization	Employee category	Total population	% of the total population	Sample size With 5% allowed for attrition
KAA(Kenya Airport Authority)	KAA Employees	780	42	141
Department of Immigration	Immigration Employees	160	9	29
Kenya Airport Police	Airport police	250	14	45
Kenya Civil Aviation Authority	Air Navigation Services Employees	160	9	29
Port Health	Port Health Employees	80	4	15
Cleaning Contractors	Steward/Stewardess	420	22	77
<b>Total population</b>		<b>1850</b>	<b>100</b>	<b>340</b>

### 3.4 Data Processing and Analysis

After the fieldwork the obtained data was coded and classified for easy identification and then summarized for ease in interpretation. Results were organized, summarized and presented using tables, pie charts, bar graphs among others. Statistical Package for Social Scientist (SPSS) and Excel software were used for data analysis.

### 4.0 Results and Discussion

Babbie (2002) argues that in descriptive survey research, response rate above 50% is adequate for data analysis. Mugenda (2003) asserts that a rate of 50% or higher is adequate for data analysis. This implies that 87.9 % response rate was very appropriate for data analysis.

#### 4.1 Fire Safety Awareness of the Airport Workers

The first objective of this study was to establish the fire safety awareness of the airport workers. In order to determine the awareness levels of Airport workers; respondents were presented with several yes/no questions as shown in Figure 1.

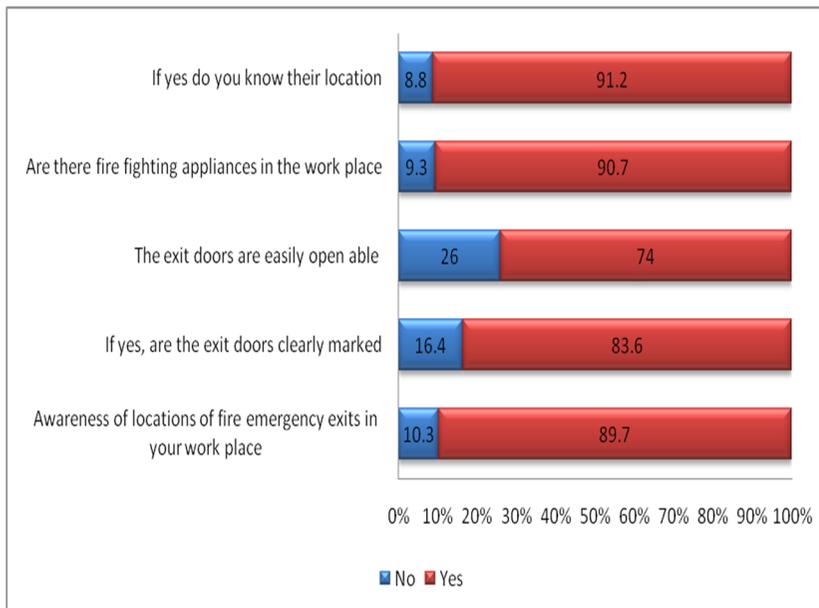


Figure 4: Fire safety Awareness

Most of the respondents (89.7%) were aware of the locations of fire emergency exits in their work places whereas (90.7%) of the respondents were aware of firefighting appliances in their workplace for use in case of fire and (91.2%) could locate them. More than a quarter (26%) of the respondents reported that the exit doors were not easily openable and 16.4% reported that the exit doors were not clearly marked.

#### 4.2 Awareness of Locations of Fire Emergency Exits by Respondents' Demographics

Chi-Square test was used to test the association between respondents' demographics (Gender, age, level of education and length of work at the Airport) and awareness of locations of fire emergency exits and results displayed in Table 2.

Table 9: Awareness of locations of fire emergency exits by respondents' demographics

Variable	Category	Aware of locations of fire emergency exits in work place		
		No	Yes	Chi-Square
Gender	Female	15.7%	84.3%	$\chi^2=5.559$ , df=1, p=.018
	Male	6.7%	93.3%	
Age	18-29	8.7%	91.3%	$\chi^2=2.750$ , df=3, p=.432
	30-39	8.2%	91.8%	
	40-49	16.0%	84.0%	
	50-59	14.3%	85.7%	
Highest level of education	Secondary	5.4%	94.6%	$\chi^2=6.215$ , df=2, p=.045
	Graduate	15.7%	84.3%	
	Post graduate	13.9%	86.1%	
Years of work at the Airport	Below 1	17.3%	82.7%	$\chi^2=6.849$ , df=5, p=.232
	1-5	14.2%	85.8%	
	5-10	13.7%	86.3%	
	10-15	10.0%	90.0%	
	15-20	13.3%	86.7%	
	Above 20	6.7%	93.3%	

In terms of gender, the results indicated that most of the male respondents (93.3%) were aware of locations of fire emergency exits as compared to the female respondents (84.3%). This association of awareness of locations of fire emergency exits and gender of the respondents was statistically significant since the p-value was less than 5% level of significance ( $\chi^2=5.559$ , df=1, p=.018). Most of the younger respondents (18-39 years) were aware of locations of fire emergency exits as compared to the older ones however, this association was not statistically significant since the p-value was greater than 5% level of significance ( $\chi^2=2.75$ , df=3, p=.432).

Most of the respondents that had secondary education were aware of locations of fire emergency exits as compared to the other higher levels of education. This association of awareness of locations of fire emergency exits and level of education of the respondents was statistically significant since the p-value was less than 5% level of significance ( $\chi^2=6.215$ , df=2, p=.045). This association can be attributed to the technical nature of work of the less educated respondents. Most of the respondents with over 20 years working at the airport were aware of locations of fire emergency exits as compared to the newer respondents. This would be due to experience and training which is a way of increasing public fire safety knowledge and improving their response to fire emergencies. The association of awareness of locations of fire emergency exits and length of time working at the Airport of the respondents was not statistically significant since the p-value was greater than 5% level of significance ( $\chi^2=6.849$ , df=5, p=.232).

**4.3 Awareness of Fire Fighting Appliances by Respondents’ Demographics**

Chi-Square test was used to test the association between awareness of firefighting appliances and Gender, age, level of education and length of work at the airport and the results are as shown in Table 3.

*Table 10: Awareness of fire-fighting appliances in the work place by respondents’ demographics*

Variable	Category	Awareness of firefighting appliances in the work place		Chi-Square
		No	Yes	
Gender	Female	13.6%	86.4%	$\chi^2=3.177$ , df=1, p=.075
	Male	7.1%	92.9%	
Age	18-29	7.9%	92.1%	$\chi^2=4.019$ , df=3, p=.259
	30-39	16.7%	83.3%	
	40-49	4.2%	95.8%	
	50-59	7.9%	92.1%	
Highest level of education	Secondary	4.5%	95.5%	$\chi^2=7.215$ , df=2, p=.027
	Graduate	12.6%	87.4%	
	Post graduate	17.5%	82.5%	
Years of work at the Airport	Below 1	13.7%	86.3%	$\chi^2=8.719$ , df=5, p=.121
	1-5	14.5%	85.5%	
	5-10	12.0%	88.0%	
	10-15	8.0%	92.0%	
	15-20	6.7%	93.3%	
	Above 20	6.5%	93.5%	

In terms of gender, the results indicated that most of the male respondents (92.9%) were aware of fire-fighting appliances in the work place as compared to the female respondents (86.4%) however, this association was not statistically significant ( $\chi^2=3.177$ , df=1, p=.075). Most of the respondents at age group 30-39 years were more aware of fire-fighting appliances in the work place as compared to the other age groups however, this association was not statistically significant ( $\chi^2=4.019$ , df=3, p=.259). Most of the respondents that had secondary education were aware of fire-fighting appliances in the work place as compared to the other higher levels of education. This association was statistically significant ( $\chi^2=7.215$ , df=2, p=.027). Most of the respondents with over 15 years working at the airport were aware of the location of fire-fighting appliances in the work place as compared to those who had worked between (1-5 years) however, this association was not statistically significant ( $\chi^2=8.719$ , df=5, p=.121).

**4.4 Type of Fire-Fighting Appliances Provided**

When asked to indicate the type of fire-fighting appliances provided, most of the respondents mentioned portable fire extinguishers (41%), hose reels (35%) and fire hydrants (19%).

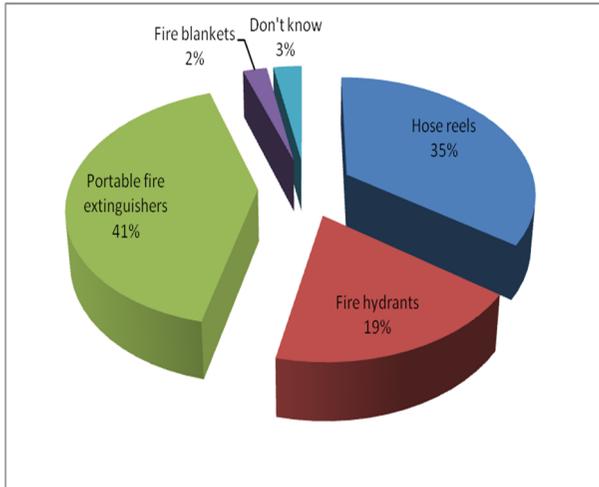


Figure 5: Firefighting appliances provided

#### 4.5 Fire Safety Measures in Place to Minimize and Mitigate The Potential Effects of Fire Disaster

The second objective of this study was to evaluate the fire safety measures that have been put in place to minimize the potential effects of fire disaster at JKIA as shown in Figure 3. Most of the respondents (75%) reported that there were fire detectors at their workplace. When asked to state the types of fire detection systems provided, most of the respondents (86%) reported smoke detectors with a few reporting heat detectors (14%) and flame (15%).

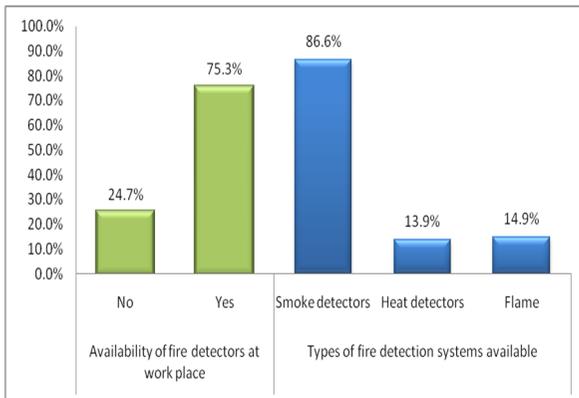


Figure 6: Availability of fire detectors

##### 4.5.1 Awareness of Presence of Fire Detectors by Respondents' Demographics

Chi-Square test was used to test the association between awareness on presence of fire detectors at the Airport and the respondent's demographics parameters as shown in Table 4.

Table 11: Fire detectors at work place

Variable	Category	Availability of fire detectors at work place		
		No	Yes	Chi-Square
Gender	Female	29.7%	70.3%	$\chi^2=2.02$ , df=1, p=.155
	Male	21.6%	78.4%	
Age	18-29	22.9%	77.1%	$\chi^2=11.048$ , df=3, p=.011
	30-39	15.3%	84.7%	
	40-49	37.0%	63.0%	
	50-59	40.9%	59.1%	
Highest level of education	Secondary	20.4%	79.6%	$\chi^2=2.772$ , df=2, p=.250
	Graduate	30.9%	69.1%	
	Post graduate	27.0%	73.0%	
Years of work at the Airport	Below 1	19.5%	80.5%	$\chi^2=12.775$ , df=5, p=.026
	1-5	22.7%	77.3%	
	5-10	13.7%	86.3%	
	10-15	36.4%	63.6%	
	15-20	46.7%	53.3%	
	Above 20	39.3%	60.7%	

The results showed that most of the male respondents (78.4%) reported availability of fire detectors at work place as compared to the female respondents (70.3%) however, this association was not statistically significant ( $\chi^2=2.02$ , df=1, p=.155). Most of the younger respondents (18-39 years) were aware of availability of fire detectors at work place as compared to the age bracket of (50-59 years). This association of availability of fire detectors at work place and age of the respondents was statistically significant ( $\chi^2=11.048$ , df=3, p=.011). Most of the respondents that had secondary education reported availability of fire detectors at work place as compared to the other higher levels of education however, this association was not statistically significant ( $\chi^2=2.772$ , df=2, p=.250). Most of the respondents with less than 10 years working at the airport reported availability of fire detectors at work place as compared to those with more than 10 years' experience. This association of availability of fire detectors at work place and length of time working at the airport of the respondents was statistically significant ( $\chi^2=12.775$ , df=5, p=.026).

#### 4.5.2 Fire Safety Training Programmes

On rating fire-safety measures the respondents were requested to state whether they had been subjected to various training programmes as shown in Figure 4. Almost a third of the respondents (29.8%) had not been trained on how to use a fire extinguisher while a quarter of the respondents (25.8%) had not been trained on what actions to take in case of a fire outbreak. A quarter of the respondents (23.3%) reported lack of procedures in place for emergency evacuation in case of fire at their workplaces. Most of the respondents (87.7%) were aware of emergency assembly point at their workplace and close to a half of the respondents (42.5%) reported that

their workplace does not carry out emergency evacuation drills. Lack of training on basic fire safety increases the risk of fire outbreaks as well as resulting in poor response in case of an emergency.

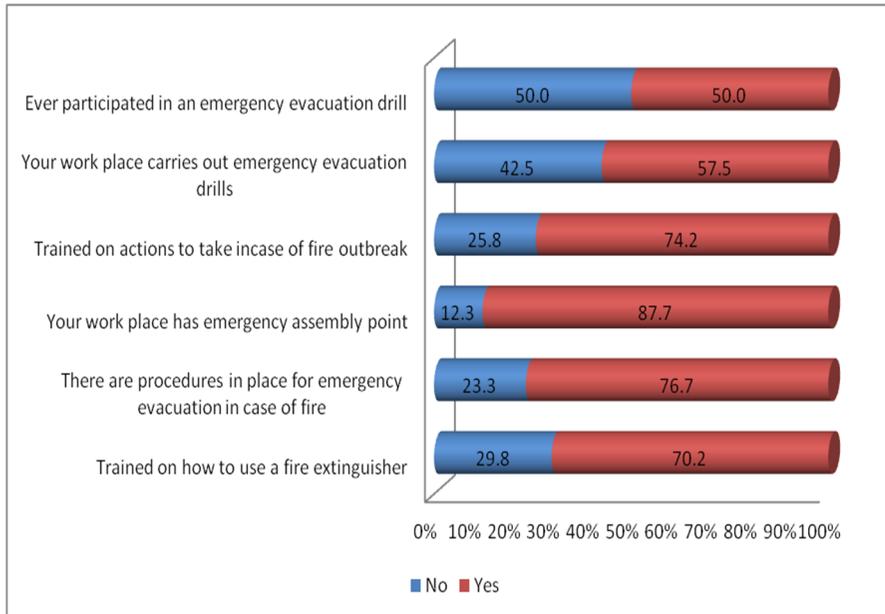


Figure 7: Rating of fire safety measures

#### 4.5.3 Training On Use of Fire Extinguisher By Respondents’ Demographics

Chi-Square test was used to test the association between training on use of fire extinguisher at the Airport and respondents’ demographic parameters as shown in Table 5.

Table 12: Training on use of fire extinguisher by respondents’ demographics

Variable	Category	Trained on how to use a fire extinguisher		Chi-Square
		No	Yes	
Gender	Female	42.9%	57.1%	$\chi^2=13.172$ , df=1, p<.001
	Male	22.2%	77.8%	
Age	18-29	35.6%	64.4%	$\chi^2=3.999$ , df=3, p=.262
	30-39	31.1%	68.9%	
	40-49	30.0%	70.0%	
	50-59	15.4%	84.6%	
Highest level of education	Secondary	30.9%	69.1%	$\chi^2=0.380$ , df=2, p=.827
	Graduate	28.3%	71.7%	
	Post graduate	26.2%	73.8%	
	graduate			
Years of work at the Airport	Below 1	40.7%	59.3%	$\chi^2=15.856$ , df=5, p=.007
	1-5	33.3%	66.7%	
	5-10	30.8%	69.2%	

10-15	28.0%	72.0%
15-20	13.3%	86.7%
Above 20	6.3%	93.7%

The results showed that most of the male respondents (77.8%) were trained on how to use a fire extinguisher as compared to the female respondents (57.1%). This association of training on how to use a fire extinguisher and gender of the respondents was statistically significant ( $\chi^2=13.172$ ,  $df=1$ ,  $p<.001$ ). Most of the older respondents (above 40 years) were trained on how to use a fire extinguisher as compared to the younger ones however, this association was not statistically significant ( $\chi^2=3.999$ ,  $df=3$ ,  $p=.262$ ). Most of the respondents that had secondary education were not trained on how to use a fire extinguisher as compared to the other higher levels of education however, this association was not statistically significant ( $\chi^2=0.380$ ,  $df=2$ ,  $p=.827$ ). Most of the respondents with over 10 years working at the airport were trained on how to use a fire extinguisher as compared to those who had worked between (1-5) years. This association of training on how to use a fire extinguisher and length of time working at the airport of the respondents was statistically significant ( $\chi^2=15.856$ ,  $df=5$ ,  $p=.007$ ).

#### 4.5.4 Procedures in place for emergency evacuation by respondents' training

Chi-square test was used to test the association between awareness on procedures in place for emergency evacuation in case of fire at the airport and trainings on how to use a fire extinguisher and action to take in case of fire outbreak parameters as shown in Table 6.

Table 13: Procedures in place for emergency evacuation in case of fire

Variable	Category	Procedures in place for emergency evacuation in case of fire		Chi-Square
		No	Yes	
Trained on how to use a fire extinguisher	Yes	26.2%	73.8%	$\chi^2=9.237$ , $df=1$ , $p=.031$
	No	62.0%	38.0%	
Trained on what actions to take in case of a fire outbreak	Yes	26.9%	73.1%	$\chi^2=11.148$ , $df=1$ , $p=.036$
	No	58.8%	41.2%	

The results showed that most of the respondents trained on how to use a fire extinguisher (73.8%) were aware of procedures in place for emergency evacuation in case of fire as compared to those not trained (38.0%). This association of awareness of procedures in place for emergency evacuation in case of fire and training on how to use a fire extinguisher was statistically significant ( $\chi^2=9.237$ ,  $df=1$ ,  $p=.031$ ). Most of the respondents trained on what actions to take in case of a fire outbreak (73.1%) were aware of procedures in place for emergency evacuation in case of fire as compared to those not trained (41.2%). This association of awareness

of procedures in place for emergency evacuation in case of fire and training on what actions to take in case of a fire outbreak was statistically significant ( $\chi^2=11.148$ ,  $df=1$ ,  $p=.036$ ).

#### **4.2.5 Respondents actions in case of a fire outbreak**

Respondents in an open-ended question were asked to state in their own words, what they would do in case of a fire outbreak in their workplace. A total of 24 likely actions to take in case of a fire outbreak were detected and the most reported actions included; run shouting fire, fire and calling for help (37.2%); crawling towards fire exit doors (25.3%); using fire-fighting equipment available to put off the fire (20.4%); alerting the fire brigade department (17.8%); switching on the alarm siren (16.0%); running towards fire assembly points (15.6%); following emergency evacuation procedures (12.6%) and walking out of the building (11.9%).

#### **4.5.6 Fire Disaster Preparedness**

On a five point Likert scale respondents were asked to rate their workplace in terms of fire disaster preparedness. The responses ranged from 1-strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. Most of the respondents (70.2%) agreed that their workplace has well-trained manpower to handle fire emergencies. Slightly over a half of the respondents (55.8%) were well prepared to handle any fire related incidences at their workplace while (53.0%) of the respondents reported availability of good refresher courses and drills offered at their workplace to enable them handle any fire emergencies/disasters. Most of the respondent (72.4%) agreed that their workplace has facilities to handle any fire related incidences. The findings support those of International Strategy for Disaster (2003) which document that for fire disaster response and recovery plans to be effective and hence successful, it is important for the responders to know what to do and how to do it in case of a disaster, described as empowering the community to participate in disaster recovery.

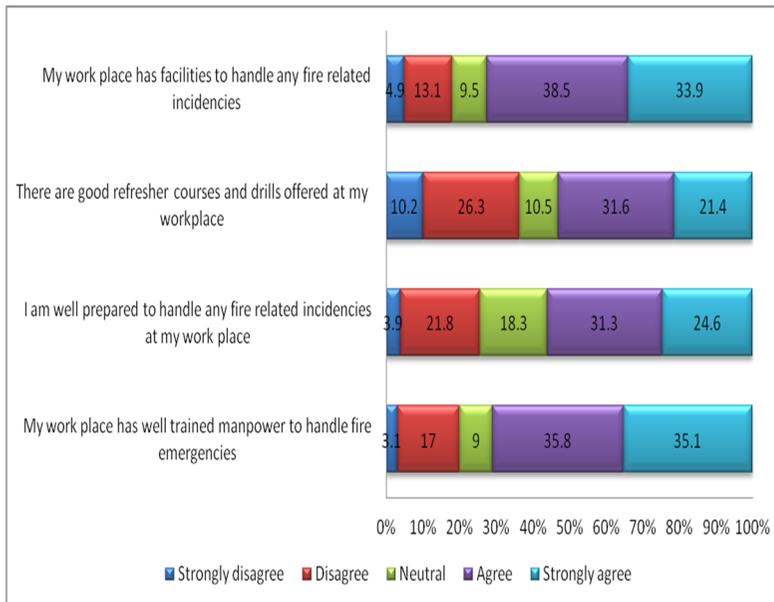


Figure 8: Rating of workplace in terms of fire disaster preparedness

### 5.0 Discussions and Conclusion

Most of the respondents were aware of the locations of fire emergency exits in their work place as well as fire-fighting appliances for use in case of fire and could locate them. These findings support Mostue (2001) who documented that awareness level of the fire safety management will help reduce the losses and damages suffered during fire outbreaks.

More than a quarter of the respondents reported that the exit doors were not easily open-able and almost a fifth reported that the exit doors were not clearly marked, these findings do not conform to those of Home Office, Scottish Executive Department of Environment, Northern Ireland (1999), that documented that escape signage should be clearly visible formal locations in the workplace, and the sign on the fire exit door prominently displayed. Obwaya (2010) also observed that Jomo Kenyatta International Airport has inadequate fire/emergency escapes routes and few trained personnel in firefighting.

When asked to indicate the type of fire-fighting appliances provided, most of the respondents mentioned Portable fire extinguishers, Hose reels and Fire hydrants. The findings are in line with fire rules that every occupier shall ensure that highly flammable substances are stored in suitable fixed storage tanks in safe positions, or in suitable closed vessels kept in a safe positions in the open air (GoK, 2007).

Most of the respondents reported that there were fire detectors at their workplace. When asked to state the types of fire detection systems provided, most of the respondents reported smoke detectors with a few reporting heat detectors and flame. The findings are in line with fire safety provision that, every occupier shall ensure that fire detection appliances are located in the appropriate places for immediate activation of an alarm or automatic fire extinguishing systems GoK (2007).

Almost a third of the respondents had not been trained on how to use a fire extinguisher while a quarter of the respondents had not been trained on what actions to take in case of a fire outbreak. The findings do not conform to those of Okungu (2006) who recommended appropriate training in fire disaster preparedness for all workers.

Based on the results of the study, JKIA has inadequate preventive and preparedness measures in place to minimize the potential effects of any fire disaster occurrence. JKIA lack mechanism to integrate the safety standards and practices of the different stakeholders in and around the airport.

## **6.0 Recommendations**

The study noted that there is lack of a mechanism to integrate the safety standards and practices of the different stakeholders in and around the airport. The study recommends an integrated fire disaster management system involving all organizations operating at the airport and a provision for more and bigger emergency exits and a public address system that can be relied upon in case of a fire disaster.

General safety compliance starts with the individual. Development of policies, enforcement of rules and procedures and installation of physical structures to manage fire safety would have little effect unless the personal attitude and perceptions of each individual towards safety is positive. This calls for a safety culture transformation in the society and it starts with each person. Kenya Airport Authority can transform the safety culture through demonstrated and visible leadership commitment by provision of both human and financial resources, recognizing and rewarding staff and departments.

A standard curriculum on fire safety should be developed in order to harmonize the information that is disseminated to the various workers in the Airports by the approved fire safety trainers. Impact of the training should also be evaluated. There is need to create awareness on benefits of a good safety management system to the top level management of airports and organizations, employees and the general public.

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