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Disaster Risk Reduction Programs and Their Effectiveness at Workplace in Industries, Eldoret Municipality, Kenya

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Abstract
According to the Kenya Minister of State for Special Programs (MSSP),Kenya lacks a comprehensive disaster preparedness policy. It has inefficient disaster management framework and strategies, which makes its economy and population highly vulnerable to natural and manmade disaster risks. Major disaster response initiatives are an *ad hoc* and short term and mainly comprising of emergency relief. It has previously managed some of them without an effective emergency system due to high level of support from the international community leading to huge costs to the country (GoK, 2009). This paper looks into the disaster risk reduction programs employed by industries at workplace in Eldoret Municipality, Kenya. The study employed survey and evaluation designs. Purposive sampling was used to select the industries and simple random sampling to select the study units which included; Managerial staff and workers of large, middle and small scale factories in Eldoret, labor officers in the Ministry of labor (Public Health Officers), fire brigade officers, Kenya National Environment Management Authority and the Kenya Red Cross Society Regional officials. Interviews and questionnaires were used for data collection from administrators and other factory employees while observation was used to identify risks within the workplace. Data was analyzed using descriptive statistics, frequencies, *t*-test,x^2-square and ANOVA.It was concluded that Education and training is a major risk reduction measure that employers must have in place as a program to curb workplace hazards. They should ensure job applicants are adequately trained, and if not, provide for them on job training. The study therefore recommended that employers should ascertain the knowledge level of their employees before assigning them duties on machinery.
Keywords: Disaster management programs, Risk reduction, Effectiveness, Workplace risks, Hazards, Machinery.

1. Introduction

Few studies have been carried out on disaster risk reduction programs in Kenya, yet this is a very important activity in development andsustainability. A study by Cherono (2012) "Occupational accidents in hotels within Eldoret Town: Awareness and Prevention" revealed gaps in staff awareness of safety regulations procedures and policies in hotel industries.

Such reports have actually showed that there are gaps in disaster risk reduction, since most factories lack adequate disaster capabilities, while others do not even have a single fire extinguisher. Factories that had fire extinguishers did not have competent people to operate them. Why is it that accidents are frequent yet Kenya has policies for risk reduction as indicated in the Occupational Safety and Health Act 2007? This consequently prompts the need for a study on work-place risks and measures to curb the same in other types of industries in government, hence this paper on disaster risk reduction in workplace.

1.1 Risk Reduction Programs for Industries

The paper identified some of the programs established in other places and therefore related these programs to those that were available in industries under study and how effective they are in Disaster Risk Reduction (DRR) for employees. According to IFRC (2010) risk reduction programs for industries cannot be underestimated since disasters cause adverse effects on social, economic, and environmental development in vulnerable communities. Pro-Vention was created in 2000 to provide a forum for dialogue and for catalyzing new ideas and collaborative initiatives on disaster risk reduction. It includes a broad range of partners, from development to humanitarian organizations and from the public sector to the private sector (IFRC, 2010).

In February 2010, a large fire at the Gary & Garib Sweater Ltd factory in Bangladesh sadly took lives of 21 workers and injured another 50(ILRF, 2010). This was five years since the Spectrum disaster. This was because effective and proactive action had not been taken to ensure that garment workers' lives in Bangladesh are safe from disasters. The Bangladesh garment has had a bad safety record. Within a year of the Spectrum collapse, around 65 workers in KTS Textiles and Sayem Fashions lost their lives. Two weeks after the Gary & Garib fire, another worker lost her life in another factory, Matrix Sweater. Between 2005 and 2010, at least 172 workers were killed (ILRF, 2010). It is such incidences that create the need for a proactive step by international, regional and national programs in DRR. Some of the programs that have been in use and recommended include; Awareness and Preparedness for Emergencies at Local Levels(APELL), education and training of workers, safe plant and equipment design, use of personal protective equipment, undertaking control measures, design early warning systems and legal safety procedures as well as stiff compensation and insurance policies.

1.1.1 Awareness and Preparedness for Emergencies at Local Levels (APELL)

APELL addresses all emergencies related to any industrial or commercial operation with potential for fire, explosion, spills or releases of hazardous materials. According to Myers (2005), there is need to create and/or increase community awareness of possible hazards involved in the manufacture, handling and use of hazardous materials, and of steps taken by authorities and industries to protect the community from these hazards. Most industrial facilities have a responsibility to establish and implement a 'facility emergency response plan', and there may also be national government emergency plans or programs in place. In order for local authorities and local leaders to play an effective role in the process, there must be close and direct interaction with representatives from industrial facilities in their local area. There is need for interaction between local government and industry. Industry representatives and local authorities/leaders can form a coordinating group. The coordinating group then forms a bridge between the community, local authorities and industry to create awareness and prepare workers for emergencies (Myers, 2005).

1.1.2 Education and Training of Workers

According to Schreiner (2011), on-the-job accidents can result in injury in nearly any workplace. She argued that, regardless of how safe the occupation seems, there are work related risks that could cause harm to employees if they do not exercise caution. She suggested that to ensure employees remain safe on the job; employers should educate their workers on the potential dangers so they can avoid them and maintain their personal safety. For example employers need to train workers on:

a) Fire response

All employees must be aware of the proper response to fire within the workplace. Employees should be informed of the locations of fire alarms and extinguishers. Additionally, they should be shown the exits that surround their working area to ensure that they can escape should a fire occur. To ensure optimum safety, employers can stage fire evacuation drills (Schreiner, 2011).Employees should also be:

i) Aware of the key legislation relating to fire safety.
ii) Know what the 'Fire Triangle' is.
iii) Broadly know about fire detection and warning systems, how to use and react to them.
iv) Understand the key factors relating to evacuation in the event of the fire
v) Know about the types of fire that can develop, and what type of extinguishers can be used on them.
vi) Aware of what precautions you can take to minimize the risk of fire.

b) Response to natural disasters

Natural disasters injure individuals at work. Employers therefore should prepare plans for responding to natural disasters that are prevalent in their area and ensure that employees are informed of these plans so as to take appropriate action should a natural disaster occur while still on job. Examples in this case is an earthquake that is likely to destroy buildings and life a case in point the Haiti earthquake of 2010 (UNDP, 2010).

c) Checking noise

The Centers for Disease Control recommend that businesses consider the impact that a noisy workplace has on their employees. This is particularly important in factories or other workplaces in which noise is common. By educating their employees on noise dangers and providing them tools to reduce the noise that reaches their tender eardrums, employers can ensure that their employees do not suffer loss of sense of hearing (CCC, 2010).

1.1.3 Plant and Equipment Design

Technological (industrial) hazards can be reduced by improving safety standards in plant and equipment design, anticipating possible hazards in plant designs, developing safe designs and operating procedures, safe and regulated disposal of hazardous materials and proper preparedness planning. Working in processing factories involves working near heavy machinery or machinery that moves or has moving parts. These entail some safety problems that require safe work policies and procedures to ensure everybody is doing their job safely and is committed to improving health and safety in the work place (IFCR, 2000).

Hattangadi (2005) indicates that there is need for reliability of all kinds of hardware and equipment so as to achieve zero failure performance for most of the electrical and machinery in service of industrial machinery and other areas of service for example transportation. He argues that many equipment failures including those with serious consequences are caused by physical or measurable defects that are not recognized as such. There is need for an encyclopedia of all equipment failures which highlights all the failure modes and failure mechanisms. This should be updated periodically so as to help designers review their designs and maintenance engineers to reach the correct solution.

1.1.4 Personal Protective Equipment

Myers (2006) draft for National Institute for Occupational Safety and Health (NIOSH) indicates that in every day type of work setting, personal protective technologies are important to reduce workers risk of job-related injury, illness, and death. Personal protective devices such as respirators, chemical-resistant clothing, hearing protectors, and safety goggles and glasses provide a barrier between the worker and an occupational safety and health risks (NIOSH, 2012). To use PPE requires hazard awareness and training on the part of the user, since the

equipment does not eliminate the hazard as it can fail and lead to exposure. To reduce failure the equipment must be properly fitted and maintained in a clean and serviceable condition; and should also provide workers with early warning of a hazard. Myers (2005) therefore recommends the need to analyze technologies so that critical PPE needs with a standard perspective can be filled via research agendas for specific new technologies.

1.1.5 Control/Corrective Measures

Hattangadi (2005) posit that defective or worn out components in manufacturing sectors should be discarded and replaced. That no effort should be made to repair, reclaim or rebuild the worn or degraded component. The old component should only be reclaimed under expert supervision and while in reuse should be kept under special observation. Safety designs or features should be incorporated in the designs to prevent mal-operation. To avoid pitfalls the maintenance engineer should investigate failures, determine the root causes and the appropriate corrective measures taken to ensure that a similar problem does not occur. According toJaeryl and Simpson (2002) the Labour Ministry and the disaster management team should enforce industrial safety and compliance with relevant statutes. Precautions have to be hung in offices and regular inspection on safety reports. There should be frequent fire drills and each factory should have a fire marshal. Safety equipment in factories and public places should be installed, while employers should acquaint their employees with the safety regulations in their factory.Risk control measures must be carried out in consultation with the relevant health and safety representatives and employees (COMCARE, 2005).

1.1.6 Early Warning Systems

Disaster warning networks (www.disasterwarning.com) was established after realizing the gap in the availability of early warning systems to provide an effective wireless early warning of disaster to all persons, businesses and public locations at a small cost so as to minimize loss of property and life. Because of the gaps in early warning systems, new technology is coming up (DEWN, 2012) such as tone alert radios to provide instant notification in public places.

Early warning systems are necessary before natural or manmade disasters strike. Flanagan (2011) posits that early warning can initiate those types of individual actions that can prevent injuries and loss of lives; and effective response after disaster can further assist with proper medical care and evacuation to a safe location. Warnings come before a disaster event impact and 'first response' comes after a disaster event impacts. Flanagan argues that when effective early warnings are in place, the need for first response becomes less important. An effective disaster warning system will need to aggregate real time information about disasters as they occur from a wide variety of sources, and will transmit early warning signals to users in danger before they are impacted. The early warning signals create both human and automated response, well before disaster impact the people and business. In modern industrial economies there are only rudimentary warning mechanisms. There is therefore, the need for sensors to detect the occurrence of these disasters. UNISDR (2006) identifies lack of public awareness and education for early warning response in many countries that response plans exist but are not known to the public because of weak public information and dissemination capacities. Public awareness is weakened by limited integration of disaster education in school curriculum. In general, majority of countries do not have school programmes on disaster risk reduction, early warning, preparedness and emergency response. In countries where such programmes exist, they do not always reach all schools and all children and they lack simulation exercises and evacuation.

1.1.7 Laws and Regulations

International regulations on major industrial accidents are binding regulations that assist the international cooperation in the case of major accidents with effects extending beyond national boundaries. These protective regulations rely on national legislation and practice, and define dangerous places, substances and quality of substances. In each unit posing a risk, the employer and employees should jointly draw up a regularly updated program to map out risks and provide safety instructions which will always be constantly visible and known to authorities. The authorities should monitor the quality of these programs (ILO, 1992). According to the Workplace Safety and Health ACT 1995 all persons in the workplace have an obligation to assist with risk management process. To help meet these obligations the following codes of practice and standards have been written; Workplace Health and Safety Act, Regulations and codes of practice like the Risk Management Code of Practice 2007. These provided information on how to identify a variety of workplace hazard and how to manage exposure to the risks associated with these hazards (UQ, 2010).

Kenya has an ACT of Parliament which provides for the safety, health and welfare of workers and all persons lawfully present at workplaces. The Kenya Directorate of Occupational Safety and Health Services (DOSHS) have the mandate to ensure compliance with the provisions of the Occupational Safety and Health Act, 2007, that seeks to ensure safety and health at the workplace. It also ensures compliance with the provisions of the Work Injury Benefits Act, 2007 through prompt compensation of employers against work related injuries. The occupational Safety act has ensured that each organization formulates a health and safety policy to give direction and commitment on the way they run their health and safety functions. The new Act has also ensured the establishment of National council on occupational Safety and Health in 2009 (GoK, 2011).

1.1.8 Development of Humanitarian Organizations

Disaster management, according to World Confederation for Physical Therapy (WCPT, 2010) is a complex process involving international, national and local organizations each with a role to play. To respond to disaster situations a coordinated effort is required. Some of the organizations involved in disaster management include;

i) The United Nations and its organizations for example the Office of the Coordination of Humanitarian Affairs (OCHA) in collaboration with the International Agency Standing Committee (IASC) bring together national and international humanitarian providers to ensure adherence response to emergencies.
ii) The United Nations Development program (UNDP) which assist disaster prone countries in contingency planning and with disaster mitigation, prevention and preparedness measures.
iii) The International Federation of Red Cross and Red Crescent Societies (IFRC) whose mission is to improve the lives of vulnerable people by mobilizing the power of humanity. It also coordinates and directs international assistance to victims of natural and technological disasters.
iv) International Non-governmental Agencies who work through volunteers for recovery from a disaster, prevention and preparedness, health and social programs.
v) National Organizations involved in developing national disaster management plans.

Organizations such as; ILRF, CCC,WRC and MSN recommend that the governments should eliminate systematic safety problems by ensuring that factories observe relevant laws and regulations, inspection for adherence of workplace safety and labor legislations, ensure that emergency exits are unlocked during working hours, publish factories that do not meet the required standards and close them down, and set up high investigative committee to conduct enquiries into accidents at factories involving workers' fatalities or multiple injuries, and provide emergency short time compensation and adequate disability or survivors' benefits to the families of workers who were killed or permanently disabled because of workplace accidents (CCC, 2010).

1.1.9 Insurance Cover for Employees

Jaeryl and Simpson (2002) recommend that employees in hazardous situations dealing with chemicals should have insurance beyond the meager workman's compensation. The more risky the trade process the more expensive the insurance. Insurance for a factory is usually arranged with policy wording that is split into various sectors, some of which are compulsory while others are a matter of choice. These sectors may include; factory building, factory contents (things like desks, chairs and machinery), Loss of income or interruption (for example an incidence of fire), Liability (public, employers and products), and cover for goods in transit. The insurance company require that manufacturing or service are conducted according to industrial best practice, all staff involved in the production process are trained with records kept and that all machinery is up-to-date and well maintained.

2. Materials and Methods

This paper is based on a study conducted in two large scale industries; RaiPlywood on Kenya-Uganda road three kilometers from Eldoret CBD and Ken Knit on Eldoret-Nairobi road half a kilometer from Eldoret town. Two middle level industries; the Rift Valley Bottlers opposite the Eldoret Law Courts and Pyramid Packaging Ltd off Kisumu road, and, two small scale industries; the Maize Milling Company and MajiMatamu Laundry in town Eldoret, Kenya.

The target populations included; Managerial staff and workers in the selected factories, Labor officers in the Ministry of labor, Ministry of Industrialization, fire brigade officers, Public health officers, National Environment Management Authority (NEMA) and the Kenya Red Cross Society Regional officials. The factory workers provided information on workplace safety and health and disaster preparedness. The officials from the ministries of health, labor, environment and the Kenya Red Cross provided information on the activities they wereinvolved in and how they interact with factories to ensure workplace safety and health as well as community and environmental protection from factory disasters.

The study adopted survey and evaluation research designs. According to Babbie (2010) in "The Practice of Social Research" in a survey design the respondents are selected and standardized questionnaires administered to them.

Purposive sampling (criterion sampling) was used to select industries that meet the various categories of industries – small, medium and large scale industries. A stratified random sampling method wasused to collect data from each of the workers in the departments. All the workers in every department were involved in the study so as to assess the percentage of employees injured or ill due to workplace disasters. For workers who were off duty and those who work in shifts filled questionnaires at the time they reported on duty to ensure all employees participated. It also helped to assess the rate of accidents or injuries in the workplace. From the study, the number of employees who were trained on disaster management and preparedness was known.

The study made use of a formula by the Division of the National Education (2008) to determine the stratified random sample size for the three categories of industries as:

Where,

$S=X^2 NP (1-P) \div d^2 (N-P) + X^2 P (1-P)$ …….. Equation 3.1

S = required sample size

X^2 = the table value of Chi-square for 1 degree of freedom at the desired confidencelevel (3.841)

N= the population proportion (assumed to be 0.5 since this would provide themaximum sample size).

D= the degree of accuracy expressed as a proportion (.05)

Information collected from factory workers was analyzed using SPSS software, tabulation was used for summary while percentages was used to calculate the magnitude of work place injuries and work loss days due to illness. Frequencies and percentages were used to show the hazardous levels in industries of various risks. One way ANOVA was used to compare the vulnerability of each of the various scales of industries, to assess variations of qualifications of employees within and between factories

3. Results and Discussions

3.1 Awareness and Preparedness for Emergencies in Industries, Eldoret Municipality

The findings of the study established that the workers were aware of the existing hazardous materials in their workplace. Interviews also revealed that these industries had personnel (OHS Committee) for occupational health and safety. These personnel or officers ensured education and training of workers on health and safety as well as ensuring that the required facilities (PPEs) wereprovided to ensure workplace health and safety. Most of the workers weretrained on occupational diseases, occupational hazards, preventive measures, fire safety and use of PPEsnot only knew the hazards but also what to do during emergencies.

Factory workers had acquired secondary level of education and therefore easily trained on job. The managers revealed that they were visited yearly by government officials mainly from the ministry of labor in Eldoret Municipality, who enlightened them on labor laws and ensured that they complied. They established occupation health and safety committees with representatives from each department. These committees ensured that health measures were in place within their departments and trained new employees on health precautions.

Medium scale (Rift Valley Bottlers and Pyramids limited) industries also revealed a high level of health and safety standards. However, it was observed that the Rift Valley Bottlers had a high standard of health and safety since the company was rated on international standards- International Organization Standardization (ISO). The company has achieved ISO certificates i.e. ISO 14001 of 2004 (environmental management), ISO 9001 of 2008 (Quality Management Systems) and ISO 22000of 2010 (Food Safety Management). These certificates were displayed in the OHS office noticeboard. Rift Valley Bottlers had a trained officer in occupational health and safety with international certificate on health and safety. The officerwasin charge of organizing training teams in every section and carryout internal audit and inspection which kept these sections on the toes. Health and safety tips start at the gate making visitors also alert on safety measures (Plate1).

Small scale industries had less number of machinery in their workplace and occupied small space, with fewer employees compared to large scale and medium scale therefore exposed to less risks.

Plate 1: Safety tips designed by OHS for Rift Valley Bottlers Company in Eldoret Municipality, Kenya

3.1.1 Education and Training of Workers

To ensure that employees are safe, they need to be educated on potential dangers. Majority of the employees had

acquired secondary education (37.8%) and diploma (37.7%) level. Generally, more educated and trained employees had a good understanding of the importance of protective clothing applications to reduce the rate of hazards (Figure 1).

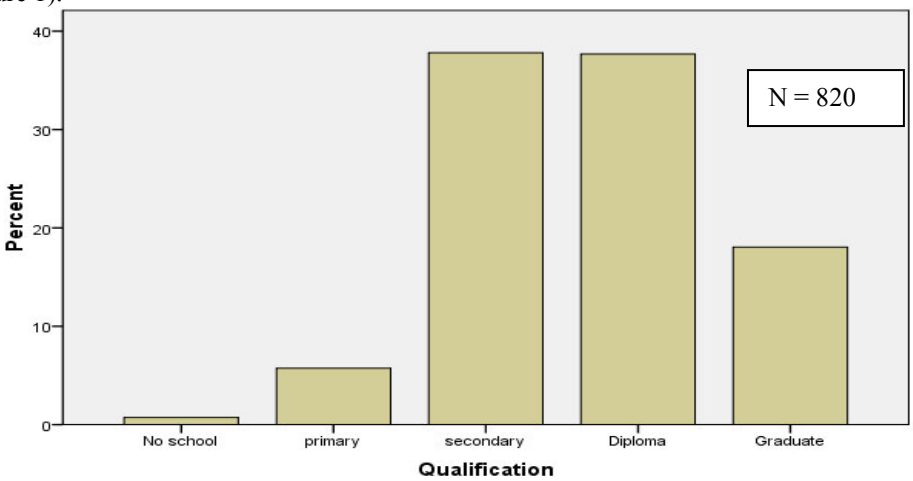

Figure 1: Education level of employees in industries in Eldoret Municipality, Kenya

From the calculated (χ^2) teststatistic for 4 degrees of freedom is 495.427. Additionally, it indicates that the significance value (0.000) is less than threshold value 0.01. This suggests that there is a high significance ($P<0.01$) between variation in the education level and the hazards encountered.

More than half the employees (64.4%) were educated beyond secondary level as indicated on figure 5.1. from interviews most of them could efficiently communicate in English or Kiswahili language an indication that they could also read and understand safety instruction and policies and therefore a reduction of risks.

Most employees especially the new onesweretrained on job even if they had undergone the same training before (Figure 2). However, from interviews, training in OHS was more effective with large scale industries than with small scale industries.

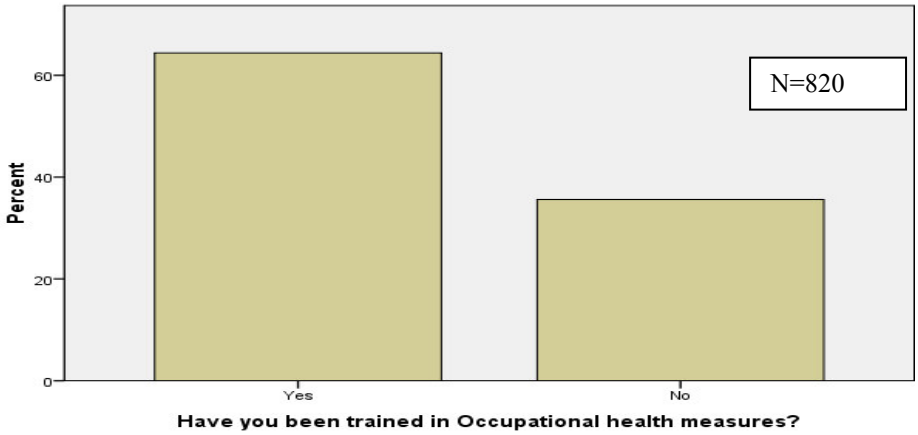

Figure 2: Percentages of trained workers in industries for Occupational Health Measures in Eldoret Municipality, Kenya

From the calculated *chi-square test* or χ^2 *test*statistics in Figure 2, for 1 degree of freedom is 67.922. The significance value (0.000) is less than usual threshold value 0.01. This suggests that there is a highly significant ($P<0.01$) variation for good level of training in occupational health and the level ofhazards encountered.

Interviews with employees revealed that therewere organizations involved in the training in specific areas of health and safety including;

(i). Universal work health and safety consultancy limited based in Nakuru and trained employees on occupational health and safety and first aid measures.
(ii). Kenya Red cross train First Aiders
(iii). AMPATH Moi Teaching and Referral Hospital Provide education on HIV/AID and other killer diseases.
(iv). Kenya Bureau of Standards

Other educational activities provided to employees included short and long term courses most of which werefree or sponsored. For example KEN KNIT Ltd provided short courses on First Aiders and occupational health and safety when need arose; takes one day to one week. Long term courses tookthree to five years.

Trainees' weresent out to local institutions like Eldoret Polytechnic, Moi University, Kenya Textile Training College and Kabete Technical Training Institute.

The industries also sent trainees to overseascountries like Germany (textile training), South Africa (Environmental Hazard Management), Denmark (textile), and India (Technical Training) for further training. Also provided wereattachments and Education tours to local institutions and outside Kenya institutions. In addition, there wasspecialized training where one wassend to an institution for specific training like; Boiler operator, machine operator and machine maintenance.

ANOVA analysis revealed that there was a significant difference between small scale, medium scale and large scale industries in the qualification of employees, ($P<0.05$) type of training and skills acquired by employees (Table 5.1). In addition there was also a significant difference in the other skills required by employees in the ($P<0.01$) three types of industries. These results also revealed that within these factories,there was a significant difference on the qualification, type of training and other safety skill required by employees. The t-test showed no significant ($P > 0.05$) difference in the means of the number of people trained between large scale, medium scale and small scale industries.

Table 1: ANOVA analysis of qualification, type of training and skills gained by employees in industries, Eldoret Municipality

		Sum of Squares	Df	Mean Square	F	Sig.
Qualification	Between Groups	5.124	2	2.562	3.469	.032
	Within Groups	603.320	817	.738		
	Total	608.444	819			
Type of training and skills gained	Between Groups	91.964	2	45.982	12.068	.000
	Within Groups	3113.025	817	3.810		
	Total	3204.989	819			
Any other safety skills required?	Between Groups	1.370	2	.685	8.930	.000
	Within Groups	62.655	817	.077		
	Total	64.024	819			

Statistically significant at P = 0.05
Statistically highly significant at P = 0.01

3.1.2 Plant and Equipment Design

Safe designs and operation procedures were identified during literature analysis as vital in ensuring safety standards. All kinds of hardware need to be reliable so as to achieve zero failure performance of electoral and machinery. Failure models have to be identified and corrected in time. From the observation made, large scale and medium scale industries had their own mechanical engineers who were involved in machine installation, maintenance and servicing to ensure that safety was up to the required standards. The machines had safety guards and operation manuals to guide the operators and protect them. This was also observed not only in large and small scale but also in small scale industries.

Plate 2: A Crane lifting and loading timber on a fork lift at RaiPlywood in Eldoret Municipality, Kenya

NB: This work place is isolated from the main factory due to the risks of workers being hit by a falling piece of wood or being hit by the pieces of logs being moved by the cranes.

Plate 3: Caution/operation manuals at Rift Valley Bottlers Eldoret Municipality

In the study, it was observed that machines had not only guards (Plate 3) but also automatic switches and alarms that were useful in the event of danger. From observation, the study found out that, there was adequate space from one machine to another (Plate 4) which allow easy movement and operation therefore reducing risks.

Plate 4: Adequate spacing between machines to allow comfortable working and reduce risks in RaiPlywood, Eldoret Municipality

3.1.3 Personal Protective Equipment (PPEs)

Personal protective equipment are important in reducing workers risks of job related injuries illness or death. Figure 3 shows some of the protective devices available during the study for workers. The most frequently used protective devices were hand gloves (18.2%) followed by overalls (17.8%).

χ^2 *test* statistic conducted for 12 degrees of freedom is 542.051. Additionally, it indicates that the significance value (0.000) is less than usual threshold value 0.01. This suggests that there is a highly significant ($P < 0.01$) variation among personal protective equipment hazards encountered in industries in Eldoret municipality in Kenya.

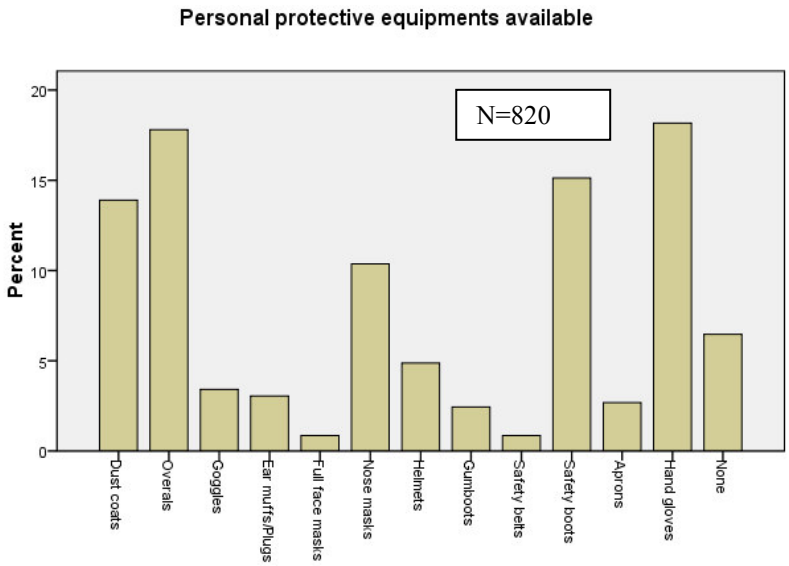

Figure 3: The Level of PPEs used in Industries in Eldoret Municipality, Kenya

Figure 3 and Plate 5showsome of the observed PPEs in use in Large Scale industries which include head gear, overall, ear mask, hand gloves and boots. However, interviews with managers of various departments in large scale industries revealed that most of them did not prefer the use of PPEs despite being aware of the consequences of working without them.

Plate 5: Overalls and hand gloves in use in Rai Plywood, Eldoret Municipality, Kenya

3.1.4 Control/Corrective Measures

The main control measures were as indicated in Table 2. Use of PPEs ranked highest with 22% followed by fire control measures with 19% as the most frequently employed control measures.

Table 2: Risk measures available in industries in Eldoret Municipality, Kenya

Risk measures	Frequency	Percent
Drinking of milk	7	.9
Good house keeping	36	4.4
Dust collection systems	17	2.1
Guarding machinery	37	4.5
Use of necessary PPE's	180	22.0
Automatic emergency switches	29	3.5
Displayed warning signs	123	15.0
Servicing machines regularly	29	3.5
	156	19.0
Strategic fire points positions	70	8.5
Workplace inspections	83	10.1
Awareness to employees andvisitors	53	6.5
None		
Total	820	100.0

Source: Field Data (2014)

χ^2 *test*statistics conducted for 11 degrees of freedom is 513.873. It indicates that the significance value (0.000) is less than usual threshold value 0.05. This suggests that there wasa highly significant (P<0.01) variation amongtheavailable risk measures in industries in Eldoret Municipality in Kenya.

Table 3 and 4indicate that there is a significant (P<0.05) difference between the risk measures available for small scale and medium scale industries, with medium enterprises scoring higher at 7.4867.

Group Statistics

Table 3: Risk measures mean variation between small and medium scales of industries in Eldoret Municipality, Kenya

	Industry type	N	Mean
Risk measures available	Small scale	20	6.7000
	Medium scale	300	7.4867

Table 4: Risk Measures T-Test for Equality of Means

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Risk measures available	Equal variances assumed	6.602	.05	-1.258	318
	Equal variances not assumed			-1.739	24.691

Plate 6: Fire assembly point at RaiPlywoods industry in Eldoret Municipality, Kenya

Strategic fire points are valuable as a risk measure since it is secluded from the processing areas making it quite strategic.

3.1.5 Early Warning Systems

Early warning systems according to literature (Flanagan, 2011) are necessary before disasters strike since they initiate individual actions that can prevent injuries and loss of lives. The early warning signals create both human and automated response before disaster. There is therefore, the need for sensors to detect the occurrence of these disasters. This paper tried to find out the early warning systems in place through observation and interviews as safety measures for employees in the factory. The main early warning systems observed in small scale industries were few signages on the machinery. In one of the medium scale industries (Rift Valley Bottlers) were automated fire and smoke sensors early warning fixed either on the walls, machinery or on the roof. There were also warning signages at the doors gates and on most Machinerylike one in Plate 7.

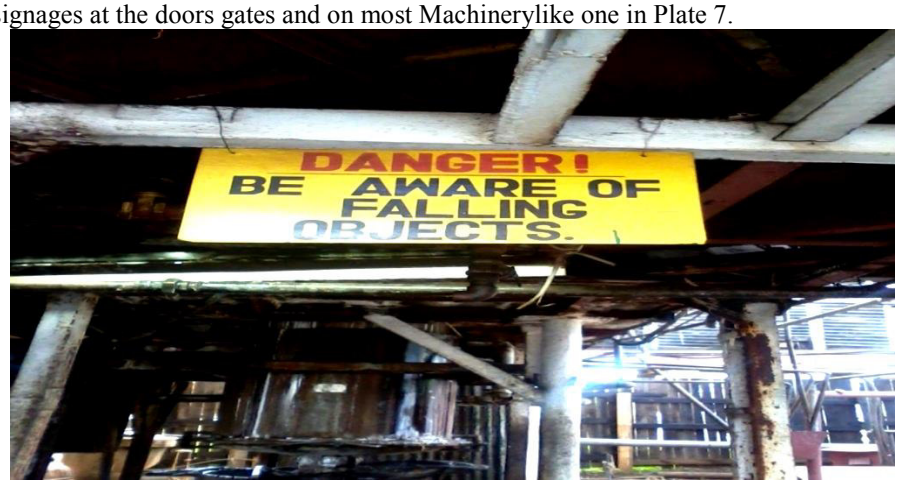

Plate 7: Cautions signage for falling objects at RaiPlywood in Eldoret Municipality, Kenya

Interviews with managers revealed that, there werealso sirens in place fixed in areas with a likelihood of fire in large scale industries. There werealso alarms attached to machines in case of fire breakout of faulty machines in progress during processes. The automatic siren and alarm points were also observed in the study in large scale industries.

3.1.6 Laws and Regulations

Interviews revealed that the industries had internal policies based on occupational health and safety Act on 2007 of Kenya. These policies were written on notices and placed on noticeboards. The same was not observed in small scale industries. This laxitywas due to failure of follow up by the Kenya DOSH. In large scale industries, it was observed that there wererules governing machine operators in every department (operators' instructions). Interviews and observed workshop schedules in large scale industries revealed that new employees were given instructions on how to conduct themselves in the workplace, induction and/or sponsored to health and safety workshops by the employer. From the observations made, safety norms wereposted on notice boards to ensure everyone couldread all the time and including visitors.

3.1.7 Development of Humanitarian Organizations

Interviews revealed that large scale and medium scale industries had established groups that trained and organized audits in various areas of OHS. This was equally observed in Rift Valley Bottlers industry while on her visit for research. These groups as discussed during FGDs include: First Aiders who give first aid in case of accident or injuries and help transport to hospital whenever necessary; OHS committee which coordinates all other groups and trains workers on health and safety; Fire safety groups that inspects fire extinguisher to ensure they are in good working conditions, train other workers and control fire in case of breakout; and HIV/AIDs Committee that assist in counseling and the affected workers access the necessary health services. One of the areas visited was the health center at RaiPlywood (plate8) where an interaction with the health officers revealed some of the emergencies handled including; first aid on physical injuries, HIV/AIDs, some of the terminal diseases (HBP, Diabetes)

Plate 8: Raiplywood company health center in Eldoret Municipality, Kenya

3.1.8 Insurance Cover for Employees

In large scale industries, interview with workers revealed that workers were given medical insurance cover. Upon injury in the workplace, they were taken to hospital by the employer but only limited to certain amount of expenses. To reduce on the cost of medication, RaiPlywood limited had established health clinics within the factory premises with qualified nurses. Workers were allowed to go for free examination of other illness like diabetes and high blood pressure. Apart from injuries attended to while at place of work, VCT services were also provided.

For medium scale industries, some had medical insurance cover for workers but others did not have. Apart from observation, interview with OHS officer and health nurse of the Rift Valley Bottlers revealed that they not only had insurance cover but had established a health clinic within the factory premises which catered for minor injuries and other illness. It also referred cases that required further medication such as those that required an operation.

In small scale industries, interviews with the general workers revealed lack of insurance cover but on injury the workers could be taken to hospital by theiremployer. Some of the insurance cover engaged by large scale industries to provide insurance services include; Kenindia Insurance Company, Trident Insurance Company and Group Life Assurance Company.

4. Conclusions

Some level of awareness and preparedness has been achieved in the large-scale industries but less achievement observed with small scale industries. In large-scale industries, the number of accidents was reducing on yearly basis, with increased health and safety education and training of workers. This was enhanced by the establishment of OHS committees that handled risks and trained workers on safety measures. In most medium and large scale industries, work placement was based on level of education and training at least in specific areas though on job training was also carried out.

Plant and equipment designs and operation procedures are important safety measures. PPEs are mandatory especially in large industries; however some workers are not keen in using them. Thiscalls on the managements to put in place stringent measures. There should be regular internal and external inspection/audit for risks and immediate action taken.

The more the processing activities and the more the employees in an industry, the more they are exposed to hazards and therefore more vulnerable to risks and injuries. Safety tips are quite valuable for both employees and visitors in disaster risk reduction since they create awareness and alertness of the workers and those visiting. The establishments of humanitarian organizations, OHS department, early warning systems, undertaking risk measures, insurance cover and education and training reduce workplace risks.

International organizations play a major role in establishing health and safety legislation in risk management by preparing programs and campaigns to enhance collaboration and coordination. Kenya as a country is creating awareness to honor these international legislations but has not been efficient in enhancing compliance to raise her industries to international standards. Kenya through the Ministry of Labour has established a department of DOSH to enforce compliance to legislations and enhance healthy and safety working environment for industrial workers. Kenya Red Cross, NEMA and Municipal Council Fire Brigade have played an important role in enhancing risk reduction among workers in industries from large, medium to small scale.

Education and training is a major risk reduction measure that employers must have in place as a program for intervention or ensure job applicants are adequately trained if not provide on job training.

5. Recommendation

There is need for small scale factories to undertake risk reduction measures and risk reduction programs more seriously and improve on their plant and equipment design.

References

Babbie, E. R. (2010). *The Basics of Social Research.* U.K. : Cengage Learning.

CCC (2010). *Action for state factory in Bangladesh on 5th anniversary of spectrum disaster.* Retrieved January 2nd, 2012, from www.cleanclothes.org/news/action-for-safe-factories-in-bangladesh-on-5th-anniversary-of-spectrum-disaster#1.

Cherono, L. (2012). *Occupational accidents in hotels within eldoret town, Kenya. Awareness and prevention Kenyatta UniversityInstitutional Repository.* Retrieved February 12th, 2013, from http://accessed/ir-library.ku.ac.ke/ir/handl/123456789/3875.

COMCARE (2005). *The principals of effective OHS risk management: Commonwealth of Australia,2005.* Retrieved January 4th, 2012, from www.comcare.gov.au/.

DEWN (2012). Disaster early warning networks questions and answers. Last retrieved from www.disasterwarning.com/q-and-a.htm. January 19th 2012

Flanagan, J. (2011). *Disaster early warning: Effective early warnings, why, how, where, when, who?* Retrieved March 20th , 2012, from www.disasterwarning.com/blog?p-143.

GOK, (2009). *Economic Survey.* Nairobi: Government Printer.

GoK (2011). *Directorate of occupational safety and health services.* Retrieved January 19th, 2012, from http;//www.doshs.go.ke/.

Hattangadi, A. A. (2005). *Plant and machinery Failure Prevention.* New Delhi: The Mc Graw-Hill companies.

IFRC (2000). *Introduction to disasterpreparedness: Disaster preparedness training programme*. Retrieved January 25, 2012, from www.ifrc.org/global/dispoin.pdf.

IFRC (2010*Disaster management and risk reduction: strategy and coordination.* Plan 2010.International Federation of Red Cross and Red Crescent Societies.

ILO (1992). Pevention of industrial disasters. International Labour Conference; Fifth Item on the Agenda of the 79th Session,1992. vol2p.13-German Switzerland. *International Labour Conference.* Switzerland.

Jaeryl, C., &Simpson, D. M. (2002). *An overview of disaster preparedness literature building block for an applied Bay Area Template: Center for Hazards Research and Policy Development.Working paper06-02 USA*. Retrieved January 25th, 2012, from www.hazardscenter.louisvill.edu/pdf/wpo602.pdf.

Myers, M. L. (2005). Nationalstrategy for personal protective technologies (La Trobe S.) Research for manufacturing. A draft Prepared for NIOSH.

NIOSH (2012). NIOSH List of Antineo plastic and Other Hazardous Drugs in Healthcare Settings 2012. National Institute for Occupational Safety and Health

Schreiner, P. R. (2011). Going with the flow. Wiley Interdisciplinary Reviews: Computational Molecular Science, 1 (1) 1-2.

UNDP, 2010). *Human Development Report 2010, 20th Anniversary Edition.* The Real Wealth of Nations: Pathways to Human Development. New York: Palgrave Macmillan.

UN/ISDR. (2009). *Technological Hazards.* Retrieved from http:www.preventiveweb.net/English/professional/technology/v.php?id=507.

UQOHSUnit (2010). *Occupational health & safety risk assessment risk and management guideline.* Retrieved from http://www.uq.edu.au/ohs/pdfs/ohsriskmgt.pdf on 17th January.

WCPT (2010). *Organizations involved in disaster management.* Retrieved from:www.wcpt,org/node/36994.Last accessed 15th February, 2012.