

**Evaluation of Occupational Safety and Health Management Systems
at Egerton University**

David KagoNjeru

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DECLARATION

This thesis is my original work and has not been submitted for the award a degree in any other University

Signature Date.....

David KagoNjeru

This thesis has been submitted for examination with our approval as University supervisors.

Signature Date.....

**Professor Robert Kinyua,
JKUAT, KENYA**

Signature..... Date.....

**Mr Charles Mburu,
JKUAT, KENYA**

DEDICATION

This study is dedicated to my dear wife Esther, my children Derrick, Rachael, Karen and Milkah, and to my mother Zipporah for their love, support, care, encouragement and understanding during the entire period of the study.

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LIST OF ABBREVIATIONS

DHS	Demographic Health Survey
DOSH	Directorate of Occupational Safety and Health
EHS	Emergency Health Services
EH&S	Environmental Health and safety
GOK	Government of Kenya
HCP	Health Care Personnel
IIPP	Injuries and Illness, Prevention Programme
ILO	International Labour Organization
ILO-OSH	International Labour Organization-occupational Safety and Health
MHSW	Management of Health and Safety at Work
MODU	Major Organizations Development Unit
NALGO	National and Local Government Officers' Association
OHNC	Occupational Health Nursing Certificate
OHND	Occupational Health Nursing Diploma
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Act
OSI	Occupational Stress Indicator
PACT	Placing Assessment and Counseling Team
PPE	Personal Protective Equipments
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RSI	Repetitive strain injury
SOP	Safe Operational Procedures
SOM	Society of Occupational Medicine
SSP	Statutory Sick Pay
S&H	Safety and Health
TEC	Training and Enterprise Council
WRD	Work related disease
WRULD	Work-Related Upper Limb Disorder

ABSTRACT

Despite the increasing level of interest in Occupational Safety and Health Management Systems (OSHMS), there have been few formal evaluation studies published. There is a relative paucity of information about how these systems work and how effective they are in preventing occupational injuries and diseases. The application OSHMS is based on relevant OSH criteria, standards and performance.. The purpose of this research is to evaluate the state of OSHMS at Egerton University in Kenya. Specifically, the study seeks to: determine the sources and types of hazards at the University; evaluate the level of implementation of OSHMS, and investigate the factors that influence its implementation. The study was conducted at Egerton University's four campuses within Nakuru County. The method of study was a cross sectional descriptive survey research design. Data was collected using; observation lists, interview schedules and structured questionnaires. Findings showed that the sources of hazards arose were; Office work(15%), learning (8%),gardening /farming(7%) laboratory work(20%), construction (18%),maintenance and repair(18%) security(10%), teaching(9%) and electrical works(10%). The study identified the following as types of hazards; mechanical (23%), physical (13%), biological (11%), chemical (32%) psychosocial (5%) and ergonomics (16%).On the level of implementation of OSHMS, the study found that there was no OSH policy in place (0%), organization was at 60%, planning50% and implementation at 55%, monitoring and evaluation at 30% and. The factors that influenced implementation of OSHMS included; inadequate resources, lack of training; failure to carry out medical examination; Data were analysed qualitatively using Pearsons Product Moment Correlation and also statistical package for social science (SPSS) IBM version 20 computer programs. There was a strong correlation between training and illness $r=0.101$ there was a significant correlation between workers who fell ill at work place and the use of Personal Protective Equipments. The study recommended that an OSH policy document be developed, implemented and shared to the entire stake holders, There should be regular training of workers on OSH as stipulated in the OSHA, 2007, andthere is need to carry out regular medical examination of the workers as required by the law.

CHAPTER ONE

1.1 Background of the Study

The occupational Safety and Health Management System (OSHMS) was developed by the International Labour Organization (ILO) after being deliberated on by a tripartite body in 2001. It was adopted as a tool to guide Nations, organizations and institutions for the management of occupational safety and health against Occupational Safety during the first International Conference on safety and Health at New York in 2001. The system was adopted as a benchmark for addressing work place hazards .It is therefore important to consider OSH as a primary health care(James, 2001).

There is clear evidence evident that there are various types of at Egerton. Though a lot of information is available about the importance of safety and health, Egerton University has not been able to put control measures in place to prevent, control, or improve work place environment and to control hazards. Based on the principle that decent work must be safe work, safe work aims at creating awareness of the dimensions and consequences of work related accidents, incidences and occupational diseases. The provision for occupational safety and health management system in Kenya is regulated by the Occupational safety and Health Act CAP, 514 of 2007 (GOK, 2007).

The complexity of the implementation of OSHMS depends on the size of the institution or workplace and its current OSH performance and risk profile. As an example, a large institution will have a more complex workplace risk profile than a small one due to the nature operations and activities that are undertaken in the institution. Big institutions like universities have a considerably greater number of risks to identify and control than a small primary school and therefore would require greater time and resource commitment during the initial implementation. (Michael and Merson, 2006).

All too frequently OSH management does not get the priority it merits both at the university. In order to create awareness and implement occupational safety and health management systems, universities play crucial role not only as educators and researchers but also as pacesetters. As educators, universities are expected to be at the forefront in

the appreciation and implementation of Occupational Safety and Health Management Systems (GOK, 2014).

Universities play vital roles on impacting knowledge to learners and conducting research. In order to achieve this, there is concerted effort between lecturers and workers. All activities within universities are conducted using reasonable precautions to protect all the stakeholders. All employers are expected to provide a safety and health working environment for their workers. Work related diseases (WRDs) morbidity constitutes a challenge to the training of both occupational health personnel and the experts in the rest of the health service system, as well as those in social security. Knowledge on work-relatedness is distributed in the basic education of health personnel, as well as proposals for prevention and control (Lehtinen, 2009). The work related diseases are important not only from the occupational health perspective but also as simultaneous common diseases among the general population. Working population constitutes 50–70% of the adult population in all countries; work-related morbidity is also a significant public health challenge(GOK, 2010).

Failure to implement occupation safety and health management systems can have several negative impacts on the institutions general performance The learning and teaching environment exposes the teaching and non-teaching staff to various safety and health risks such as, workplace accidents lung diseases, work stress, drug abuse, suicide attempts, fights, rapes, HIV and AIDS and institution fires among others (Lehtinen, 2009). The worst case scenario is when a member of staff dies at the university from causes that can be controlled or prevented. This can affect the morale of workmates and also other employees. there is great loss in man hours used to visit the sick workmates in hospitals. The university also has to hire another expert worker to step in as the employee recuperates in hospital. This coupled with the off duties that follow, ultimately reduce the work performance and productivity (UNDP, 1996).

Many countries all over the world have domesticated international laws and regulations on occupational safety and health to suit their requirements (ILO, 2001). The Kenyan laws Chapter, 514 popularly referred to as OSHA 2007 spells out the responsibility of

both the employer and the worker in ensuring a safe working environment and safe operational practices (SOP) for the welfare of the entire work force (GOK, 2007). In the case of universities, the management has a duty to provide and maintain plants, safe systems and procedures of work and without health risks to the workers in general. This is based on the fact that while every person has responsibility for his or her personal well-being, the primary responsibility for providing a safe and healthy working environment rests with line management (GOK, 2007).

According to OSHA 2007, Safety of workers can be ensured through a well-structured management system. Further, management's responsibilities also include ensuring that employees are trained, development and maintenance of standard operating procedures, and providing necessary safety tools and equipments (GOK, 2007).

1.2 Statement of the Problem

The level of implementation of occupational safety and health management systems determines the degree of safety and health at any university. Inadequate implementation of the systems at the university exposes workers to various occupational hazards at their work site. General observation on hazard exposure indicates that there are hazards of various types from different sources that are encountered at Egerton University. This casts doubt on the level of and effectiveness of OSHMS at Egerton University. There is glaring evidence that university employee's work under unsafe environmental conditions and also some workers use unsafe work practices exposing them to various occupational hazards.

1.3 Justification

Of the few studies that have been carried out on the effectiveness of occupational safety and health management systems none has addressed the state of OSHMS at public universities in Kenya. There is also a gap between what occurs in practice at the university and what is represented on the paper when it comes to implementation.

The outcome of this study will contribute immensely towards the control of hazards at Egerton University. Safety and health of workers contributes directly or indirectly to

production and to some extent the achievement of some of the Millennium Development Goals. One of such goals is the reduction of maternal mortality among University workers. The Kenya's vision 2030 section 5.2 aims at providing efficient and high quality health care services through prevention of diseases and injuries at work places (KNBS 2010).

The beneficiaries of this study include; the university management who are the policy makers and implementers, teaching and non-teaching staff of the university, contractors and also the students. It is hoped that this study will reduce mortality and morbidity among the university community arising from their work site. The study will also add value to the existing knowledge on safety and health information at Egerton University.

1.4 Objectives

1.4.1. Main objective

To Evaluate the State of Occupational Safety and Health Management Systems as a tool for managing occupational hazards at Egerton University

1.4.2 Specific objectives

The specific objectives of the study were:

1. To determine the sources and types of hazards encountered at Egerton University.
2. To evaluate the level of implementation of occupational safety and health management systems at Egerton University.
3. To investigate factors that influence implementation of occupational safety and health management systems at Egerton University.

1.5 Research questions

1. What were the sources and types of hazards encountered by workers at Egerton University?
2. What was the level of implementation of occupational safety and health management systems at Egerton University?
3. What factors influenced implementation of occupational safety and health management systems at Egerton University?

1.6. Scope of the Study

The general administrative structures of the university where workers are employed are three. These are: the administrative division, the research and extension and the academic section. The academic section is further stratified into eight faculties which have both teaching and non-teaching staff and also students. This study excluded the students because the target group was the workers and also because the classroom and lab information on hazards will be same as for academic staff and lab technicians. The study was conducted among the teaching and non-teaching staff of Egerton university campuses. It included permanent and workers who were on contract. These groups included staff at Njoro main campus, the Nakuru Town Campus, Nakuru town Centre and Faculty of Health Sciences. Gender consideration was made in all the campuses in order to get an exhaustive picture. Inclusion criteria included workers who are on contract while exclusion criteria included visitors, supplier and students.

1.7. Limitation of the study

The limitation of this study included inadequate resources like time and finance. The other limitation was lack of cooperation amongst the participants. The results of this type of study cannot be generalized as the scenario might be different from one University to another.

1.8 Conceptual framework



Figure 1:1: Elements of OHSMS (NIOSH, 2011)

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of the literature. It reviews the sources and types of hazards and the control measures taken by other organizations internationally, nationally and at organizational level. The regulations that are provided by the International Labor organization (ILO) are also analyzed. The chapter also examines the elements of Occupational Safety and Health Management systems as a tool for addressing occupational hazards and their risks at organizations. Further, the review discusses the developmental concepts and the hierarchy of control of hazards. Some related case studies have been cited towards the end of the chapter.

2.1 Theoretical Principles

2.1.1 Development of Occupational Safety and Health Management System (OSHMS)

An Occupational Safety and Health and Management System (OSHMS) is a set of plans, actions and procedures that guide nations and organization to systematically manage safety and health risks associated with their business (ILO-OSH, 2001). The objectives of occupational safety and health are to ensure that the workplaces are safe for operations and that the operations do not impact negatively on the workers. The overall aim of an OSHMS is to continuously improve occupational safety and health (OSH) performance through the effective management of OSH risks and activities in the workplace (Benjamin 2008). The system provides a framework that allows organizations to consistently identify and control their occupational safety and health risks, reduce the potential for accidents, aid in legislative compliance and improve overall performance of occupational safety and health management system (ILO-OSH, 2001). Occupational safety and health management systems includes provisions for systematic identification, evaluation and prevention or control of hazards and goes beyond specified requirements of the law to address all hazards. An effective OHSMS promotes consultation in the

workplace and engages employees and other stakeholders in safety and health processes and issues. This leads to the proactive management of safety and health concerns (Marsh, 2009)

The elements for occupational safety and health management systems include; Formulation of safety and health policy in line with the national laws, organization that involves the safety and health committee and other workers of an organization, planning and implementation, monitoring and evaluation and action for continuous improvement In order to effectively achieve positive results in these areas, organizations ensures that; There is senior management commitment and employee involvement(in the case of universities it should be headed by Deputy Vice Chancellor), Worksite analysis, Hazard prevention, control and safety training (GOK, 2007).

Whereas a number of countries across the world are enacting legislative laws on occupational safety and health, many are yet to come up with these laws especially in the developing countries(ILO, 2001).In Kenya, legislation can be viewed from two scenarios namely the public sector and the private sector. In both, the occupational safety and health is established by ministry of labor and regulated by the Directorate of Occupational Safety and Health (DOSHS) (GOK , 2007). An act of parliament CAP 514 was passed and enacted in 2007 and became popularly known as OSHA, 2007. The Act provides the bare minimum in all matters pertaining to workplace safety and health including. Some of the main areas it addresses include: Administration of the Act, Enforcement of the law, and Registration of work places among other areas. The sections that guide university management include: the health general provisions of the law, Machinery safety, General safety provisions, Chemical safety, Welfare general provisions and health, Safety and welfare special provisions. Current occupational surveillance systems are not designed to collect the specific information needed to identify and address the root causes of non-infectious injuries and illnesses among HealthCare Personnel (HCP)(NIOSH, 2007).

According to Travis M.,2009,Strategies and solutions need to be developed and applied both for well-known hazards and risks such as those arising from dangerous substances,

machinery, tools and manual handling. The emerging issues, such as biological hazards, psychosocial hazards and musculo-skeletal disorders need to be addressed (strategy of occupational Health and safety conference 2004). In addition, as OSH is an intrinsic part of social relations it is affected by the same forces of change that prevail in national and global socio-economic contexts (Travis, 2009).

Reports from the First International Conference on Health and Safety 2004 in concluded a clause which stated that OHSMS would not make a difference unless it reflects an overall positive approach to management by the principals of organizations. An OHSMS is only part of the company or organization's management system. The system is intended to help organizations to control occupational safety and health hazards. The system was developed in response to widespread demand for a recognized standard against which to be certified and assessed. (ILO 2001). Any OHS management system must link business processes in order to effectively manage and continually improve its operations. The OHS management systems becomes the framework in which program activity is planned, implemented, evaluated, improved, documented and verified. Thus the proper flow of information is the "life blood" of any organization (ILO, 2004).

2.1.2 Occupational Safety and Health Policy

The Safety and Health (S&H) policy is a declaration of the intention of the company or organization plans to undertake in order to safeguard the safety and health of its employees, customers, suppliers and contractors. The employer, in consultation with workers and their representatives, sets out in writing an OSH policy, which is: specific to the organization needs and appropriate to its size and the nature of its activities, Concise, clearly written, dated and made effective by the signature or endorsement of the employer or the most senior accountable person in the organization. The policy statement on safety and health is communicated and readily accessible to all persons at their place of work. The policy is usually reviewed for continuing suitability, and made available to relevant external interested parties, as appropriate (ILO, 2001).

2.1.3 Worker participation, organization and communication

According to OSHA 2007, the other important component of OSHMS is worker participation. Employer is tasked with the duty to ensure that workers and their safety and health representatives are consulted, informed and trained on all aspects of OSH, These include: emergency arrangements, First Aid, Fires safety, Electricity safety, machinery safety among others that are associated with their work. The Act further requires that the employer makes arrangements for workers and their safety and health representatives to have the time and resources to update themselves about processes of organizing, planning, implementation, evaluation and action for improvement of the OSH management system. The employer is expected to ensure, the establishment and efficient functioning of a safety and health committee and the recognition of workers' safety and health representatives, in accordance with national laws and practice (GOK, 2007).

The employer has the overall responsibility for the protection of workers' safety and health, and provides or assigns leadership for OSH activities in the organization (ILO-OSH 2001). The employer and senior management allocates responsibility, accountability and authority for the development, implementation and performance of the OSH management system and the achievement of the relevant OSH objectives. According to the size and nature of activity of the organization, OSH management systems documentation establishes and may cover; The OSH policy and objectives of the organization, the allocated key OSH management roles and responsibilities for the implementation of the OSH management systems, the significant OSH hazards arising from the organization's activities, and the arrangements for their prevention and control, arrangements, procedures, instructions or other internal documents used within the framework of the OSH management system (Benjamin, 2008).

The OSH management systems documentation is expected to be: Clearly written and presented in a way that is understood by those who have to use it and periodically reviewed, revised as necessary, communicated and readily accessible to all appropriate

or affected members of the organization (Armstrong, 2001). Arrangements and procedures are established and maintained for: receiving, documenting and responding appropriately to internal and external communications related to OSH. It also ensures the internal communication of OSH information between relevant levels and functions of the organization, ensuring that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to (ILO, 2001).

2.1.4 Planning and implementation

The purpose of planning is to create an OSH management system that supports as the minimum; compliance with national laws and regulations, the elements of the organization's OSH management systems and continual improvement in OSH performance (ILO, 2001). The organization's existing OSH management system and relevant arrangements is evaluated by an initial review, as appropriate. In case there is no OSH management system in place or if the organization is newly established, the initial review serves as a basis for establishing an OSH management system (ILO, 2001)

According to OSHA 2007, the initial review is carried out by competent persons, in consultation with workers and/or their representatives, as appropriate. It identifies the current applicable national laws and regulations, national guidelines, tailored guidelines, voluntary programmes and other requirements to which the organization subscribes. Planning and implementation programmes further identifies, anticipates and assesses hazards and risks arising from the existing or proposed work environment and work organization. It also endeavors to determine whether planned or existing controls are adequate to eliminate hazards or control risks, analyze the data provided from workers' health surveillance. This includes a clear definition, priority setting and quantification of the organization's OSH objectives, the preparation of a plan for achieving each objective and clear performance criteria indicating what is to be done by whom and when. It also selects measurement criteria for confirming that the objectives are achieved in addition to the provision of adequate resources including human and financial resources and technical support, as appropriate. The OSH planning arrangements of the organization

covers the development and implementation of all the OSH management system elements (ILO, 2001).

2.1.5 Hazard hierarchy of control

Hazards and risks to workers' safety and health require identification and assessment on an ongoing basis. Preventive and protective measures are implemented in a hierarchical order; Elimination of the hazard at the source which is achieved at the design stage through engineering controls. Control the hazard at source, through the use of engineering controls or organizational measures, substitution of hazardous substance with less hazardous without compromising the product, isolation of the hazardous area through barrier, minimize the hazard by the design of safe work systems, which include administrative control measures. Where residual hazards cannot be controlled by collective measures, the employer provides for appropriate personal protective equipment, including clothing, at no cost, and implement measures to ensure its use and maintenance (Barasa, 2014). Hazard prevention and control procedures or arrangements are established and adapted to the hazards and risks encountered by the organization. They are reviewed and modified on regular basis in order comply with national laws and regulations, and considers the current state of knowledge, including information or reports from organizations. These may include labour inspectorates, occupational safety and health services, and other services as appropriate (ILO, 2001).

The impact on OSH of internal changes (such as those in staffing or due to new processes, work procedures, organizational structures or acquisitions) and of external changes (for example, as a result of amendments of national laws and regulations, organizational mergers, and developments in OSH knowledge and technology should be evaluated and appropriate preventive steps taken prior to the introduction of changes (ILO, 2004).

A workplace hazard identification and risk assessment are carried out before any modification or introduction of new work methods, materials, processes or machinery are commissioned (Benjamin, 2008). Such assessments are done in consultation with

and involving workers and their representatives, and the safety and health committee, where appropriate. The implementation of a "decision to change" ensures that all affected members of the organization are properly informed and trained in Emergency prevention, preparedness and response. These arrangements identify the potential for accidents and emergency situations, and address the prevention of OSH risks associated with them. The arrangements are made according to the size and nature of activity of the organization by: ensuring that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite, providing information to, and communication with, the relevant competent authorities, and the neighborhood and emergency response services, addressing first-aid and medical assistance, firefighting and evacuation of all people at the worksite, providing relevant information and training to all members of the organization, at all levels, including regular exercises in emergency prevention, preparedness and response procedures. Emergency prevention, preparedness and response arrangements are established in cooperation with external emergency services and other bodies where applicable (NIOSH, 2010).

2.1.6 Procurement and contracting

Procedures for these are established and maintained to ensure that: Compliance with safety and health requirements for the organization are identified, evaluated and incorporated into purchasing and leasing specifications, National laws and regulations and the organization's own OSH requirements are identified prior to the procurement of goods and services, arrangements are made to achieve conformance to the requirements prior to their use (GOK, 2007). Plans are established and maintained for ensuring that the organization's safety and health requirements, or at least the equivalent, are applied to contractors and their workers (ILO, 2001).

Goldenhar and Linda (2001) observed that plans for contractors working on site are designed to include: OSH criteria of procedures for evaluating and selecting contractors, establishing effective ongoing communication and coordination between appropriate

levels of the organization, and the contractor prior to commencement of work. This includes provisions for communicating hazards and the measures to prevent and control them, including arrangements for reporting of work-related injuries, ill health, diseases and incidents among the contractors' workers while performing work for the organization, providing relevant workplace safety and health hazard awareness and training to contractors or their workers prior to commencing work and as work progresses, as necessary, regular monitoring OSH performance of contractor activities on site, ensuring that on-site OSH procedures and arrangements are followed by the contractor (Diana, 2012)

2.1.7 Monitoring, evaluation and internal audit

Procedures to monitor, measure and record OSH performance on a regular basis is developed, established and periodically reviewed. Responsibility, accountability and authority for monitoring at different levels in the management structure are allocated. The selection of performance indicators are based according to the size and nature of activity of the organization and the OSH objectives (ILO, 2004). Both qualitative and quantitative measures appropriate to the needs of the organization are considered. These are based on the organization's identified hazards and risks, the commitments in the OSH policy and the OSH objectives; support the organization's evaluation process, including the management review. Performance monitoring and measurement are used as a means of determining the extent to which OSH policy and objectives are being implemented. Risks are controlled and include both active and reactive monitoring, and are not based only upon work related injury, ill health, disease and incident statistics and are recorded (Lehtinen, 2009).

Monitoring provides ongoing development on OSH performance. Information to determine whether the day-to-day arrangements for hazard and risk identification, prevention and control are in place and operating effectively and the basis for decisions about improvement in hazard identification and risk control, and the OSH management system. Active monitoring contains the elements necessary to have a proactive system

and includes: monitoring of the achievement of specific plans, established performance criteria. The systematic inspection of work systems, premises, plant and equipment and surveillance of the working environment, including work organization, surveillance of workers' health, where appropriate, through suitable medical monitoring or follow-up of workers for early detection of signs and symptoms of harm to health in order to determine the effectiveness of prevention and control measures and compliance with applicable national laws and regulations, collective agreements and other commitments on OSH to which the organizationsubscribes (ILO, 2001).

Arrangements to conduct periodic audits are to be established in order to determine whether the OSH management system and its elements are in place, adequate, and effective in protecting the safety and health of workers and preventing incidents. An audit policy and programme developed includes designation of auditor competency, the audit scope, and the frequency of audits, audit methodology and reporting. The audit includes an evaluation of the organization's OSH management system elements or a subset of these, as appropriate (ILO, 2001).

The audit conclusion determine whether the implemented OSH management system elements or a subset of these: are effective in meeting the organization's OSH policy and objectives, are effective in promoting full worker participation, respond to the results of OSH performance evaluation and previous audits, enable the organizationto achieve compliance with relevant national laws and regulations, fulfill the goals of continual improvement and best OSH practice (Armstrong, 2001).

Audits are conducted by competent persons internal or external to the organizationwho are independent of the activity being audited. The audit results and audit conclusions should be communicated to those responsible for corrective action. Consultation on selection of the auditor and all stages of the workplace audit, including analysis of results, are subject to worker participation, as appropriate (Pius, 2009).

2.1.8 Action for improvement

Organizations are made and maintained for preventive and corrective action resulting from OSH management system performance monitoring and measurement, OSH management system audits and management reviews. These arrangements should include identifying and analyzing the root causes of any non-conformity with relevant OSH regulations and/or OSH management systems arrangements, and Initiating, planning, implementing, checking the effectiveness of and documenting corrective and preventive action, including changes to the OSH management system itself (ILO-OSH, 2001).

When the evaluation of the OSH management system or other sources show that preventive and protective measure for hazards and risks are inadequate or likely to become inadequate, the measures should be addressed according to the recognized hierarchy of prevention and control measures, and completed and documented, as appropriate and in a timely manner (ILO, 2004).

2.1.9 Continual improvement

Barasa (2014) observes that plans for continual improvement ideally are established and maintained continuously. These arrangements take into account: the OSH objectives of the organization, The results of hazard and risk identifications and assessments, The results of performance monitoring and measurements, The investigation of work-related injuries, diseases, ill health and incidents, and the results and recommendations of audits; the outcomes of the management review, The recommendations for improvement from all members of the organization, including the safety and health committee, where it exists; changes in national laws and regulations, voluntary programmes. Existing OSH works of a University have capability to fulfill few OHSMS requirements defined in several standards and guidelines which is positive sign for possibilities of OHSMS implementation at Universities. Healthier and safer working environment is always appreciated. The implementation of OHSMS is done in a sequential manner.

2.2 Occupational Hazards

A hazard is a dangerous phenomenon, substance, human activity or condition that has potential to cause the loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. It is any actual or potential cause of harm. It may be: an activity, an occurrence, an arrangement, a phenomenon, a circumstance, a process, an event, a situation or extreme temperatures (GOK, 2009). There are a number of theoretical approaches that can be applied in order to understand the effects of work on health. An example of this is the social constructionist theory which is concerned with hazards. Social constructionists' perspective suggests that our ability to recognize hazards and respond to the notions of risk is mediated through interaction and language while risk may be a fact of life. Exposures to the risk are not inevitable but arise from how work is organized. Health care and scientific research jobs may expose employees to hazards, for example, just as construction jobs in the 20th century often exposed workers to asbestos, which was partially banned in 1989 after it was determined to be a carcinogen (Benjamin, 2008).

A principle of the safety and health in Employment Act 1992 and Amendment Act 2002 in the United Kingdom for instance outlines the requirement of a systematic hazard management process, to identify the potential and actual sources of harm. When the sources of harm are recognized, controls are put in place to manage the risks, and prevent harm to employees and other occupiers. The hazard register lists the hazards found within the University environment and the controls. If one step fails or is impossible then the next should be explored. These include: elimination of the hazard at the source at the design stage, Substitute the hazard with a lesser risky materials but attain the same quality, Isolate the hazard: This include placing hazardous materials in a place that has less exposure place hazardous electrical plant in enclosures with restricted access place out-of-service tags on plant. If this is not practical, then, Use engineering control (British standard, 2002) .

All tools, equipment and vehicles must be properly maintained so that workers are not endangered. Construction regulations require inspections of vehicles, tools, machines

and equipment before use. This also includes: safe work procedures, work schedule including shifts and job rotations where necessary and finally use of personal protective equipment. Personal protective equipment (PPE) is the usually the last line of defense for protecting workers. (British Standards 1999)

2.3 Previous work relevant to the study

According to Tony Horara and Bill Curran (2012), Case studies are research that focus on and gather in in-depth information about a specific person, group, community or event. Case studies generally study a single person or a group of people. So the results or conclusions found cannot be applied to the general population; because the participants studied may not be accurately representative of the typical or target populace. A strength of this method is that research is able to be carried out on unusual cases that it would not be ethical to carry out in any other way.

A report on effectiveness of OSHMS by Dell (2000) on the implementation of OSHMS initiatives in Denmark, considered it to have been a success, although implementation action was more likely in larger, public sector enterprises and was focused more on repair than on fundamental prevention activity. In contrast to the success factors found in the NIOSH and related studies, there is empirical evidence pointing to factors that militate against the adoption of effective safety and health management systems. In the Danish and Norwegian internal control implementation studies, too, the vast majority of small employers had not initiated implementation action reflecting the myriad constraints impeding effective health and safety management in the small business sector, including lack of knowledge and expertise, and a mindset not conducive to a systematic approach to health and safety management.

In another observation, the state of California enacted new law mandating all the universities, and all other California employers, to develop, implement, and maintain a workplace Injury and Illness Prevention Program (IIPP). The IIPP set forth specific requirements for training, reporting hazards and accidents, inspecting the workplace, correcting hazards, and keeping records. In 1991, safety and health policies were

adopted at Stanford University which reflected on the requirements of the IIPP and responsible institutional conduct regarding environmental safety and health. These included development of policies responsibilities and practices.

In its policy document, Stanford University made reasonable efforts to: protect the safety and health of Stanford University faculty, staff and students; provide safe workplaces provide information, identify and correct health and safety hazards, for faculty, staff and students.

Stanford University identified four areas of responsibilities including; supervisory, managerial, environmental health and safety, employee and student. Employees and students are responsible for: keeping themselves informed of conditions affecting their health and safety; participating in training programs provided by their supervisors and instructors; adhering to healthy and safe practices in their workplace, classroom, laboratory and student campus residences and advising their supervisors or instructors of serious hazards in the workplace, classroom or laboratory. Required documents and records were kept to demonstrate compliance with statutes, regulations and standards. Examples of records that need to be maintained included: records of training which must include who was trained, who provided the training, what was covered during the training and what date the training took place (Antony and La Montagne, 2001).

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study design

This chapter discusses the way in which the research was carried out. It presents the instruments and methods that were used in evaluating the implementation of Occupational Safety and Health Management Systems at Egerton University. The study sought to identify the sources and types of hazards, the level of implementation of Occupational Safety and Health Management Systems and to investigate the factors that influenced implementation of the system at Egerton University.

Ogula (2005) describes a study design as a plan, structure and strategy of investigation to obtain answers to research questions and control variance. Additionally, a study design is the plan of action the researcher adopts for answering the research questions and it sets up the framework for study or is the blueprint of the researcher.

This study adopted a case study descriptive survey research design. The advantage of this case study method is that it provided a great amount of description and detail about a particular case. This helps to set the groundwork for future studies. The other advantage is to offer more opportunities for the researcher that they would not have otherwise gotten. The biggest advantage of the naturalistic observation method of research that was used in this study is that researchers viewed participants in their natural environments. This led to greater ecological validity. This case study research involves an in-depth study of individuals at the university. The strength of this type of study where observation was also used lies in the scope to probe complex hazards in order to identify new and significant ways of classifying and understanding the risks that they pose (Kerlinger, 1973).

3.2 Study area and population

The study was carried out at Egerton University campuses. Egerton University is one of the public universities in Kenya. The university upgraded to the university status in 1987 under an act of parliament. Egerton University has 9 faculties charge with education and

carrying out research work. The workers are distributed in the 3 main divisions. These are administration, research and academics. The academic staff was further classified into faculties. These faculties are: Agriculture, environment, health, veterinary, arts and social sciences, education and community studies, engineering, commerce and science.

The university is situated at central Rift Valley Region within Nakuru County which is 157 Kms from Kenya's capital city of Nairobi. The town is Located in the South Eastern part of the Rift Valley Region and borders 7 counties: These are; Baringo to the north, Laikipia to the north east, Nyandarua to the east, Kajiado to the south, Narok to the south west, with Bomet and Kericho to the west with an area of 7496.5 Km²

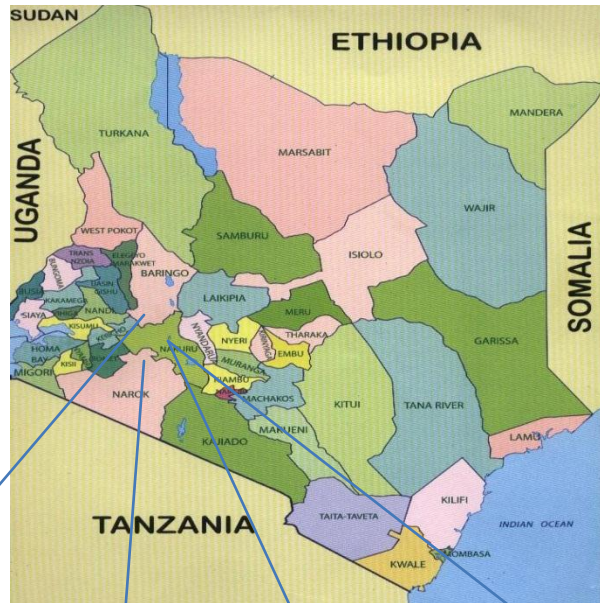


Figure 3.1 Map of Kenya showing Nakuru County (<http://www.google>)

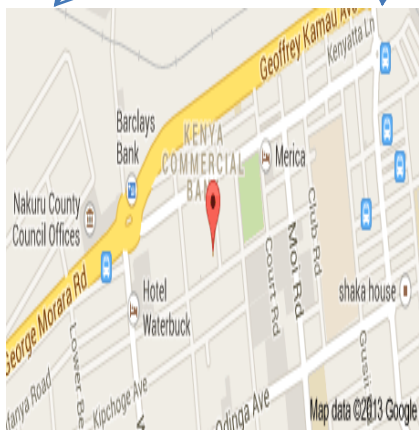


Figure 3.2 and figure 3.3 Map of Egerton University

Njoro and town Campuses (<http://www.google>)

The university has four campuses within Nakuru County that are situated at different locations. The main campus is situated at Njoro which is about 30 kms south west of Nakuru town. The other three are Nakuru town campus (NTC) situated along the NakuruEldoret highway 3kms west of Nakuru town Centre. Nakuru town Centre is situated at the central business district of Nakuru town while the Faculty of Health

Sciences is situated at milimani estate of Nakuru town next to Provincial general hospital Nakuru.

The target population for any survey is the entire set of units for which the survey data are to be used to make inferences. Thus, the target population defines those units for which the findings of the survey are meant to generalize (Kerlinger, 1973).

The study targeted workers of Egerton university community including: The management, teaching and non-teaching staff (both on full time and contract terms of employment) in all the four university campuses. The students were excluded from this study because Occupational Safety and Health Management Systems is a tool used to management hazards exposed to workers only. The number of workers was 1832 (source: human Department). The University had, teaching departments, and service/support departments. The activities within these departments differ greatly and hence the sources and nature of hazards were different.

3.3 Sampling Method

The study used stratified sampling method. First the workers were classified into the 3 main divisions. That is administrative, research and academics. Then, since the academics division has the majority of workers, it was classified into the 9 teaching faculties. The workers were then classified into 4 groups according to the nature of their work. These were technicians, office workers, teaching staff and general workers. General workers in this case were all those workers who did not fit in any of the above groups. These were: gardeners, workers in the workshops, hotels, security, farms among others. The numbers for each category was shared in the four campuses within Nakuru County. Gender consideration was also made in each category

3.4 Sample size determination

The aim of the calculating sample size is to determine an adequate sample size to estimate the population prevalence with a good precision. For this study, Fishers method was found to be suitable for use.

In order to achieve accurate results, the participants were classified into four main groups depending on the working environment.

The sample size was calculated using Fischer's method (1994)

$$\text{Thus; } n = \frac{Z^2 (p q)}{d^2}$$

n is the desired sample size

P is given statistic for level of confidence. The conventional level of confidence is usually 95% which is given as given as 1.96. It is the expected prevalence or subjects with the characteristic to be tested. This case the estimated number of workers exposed to a hazard was 75% of the total population

q is calculated by subtracting P from 1 (1-P)

d is margin of precision at 0.05

In this case the expected number of subjects with testable characteristics was estimated at 75%

$$\text{Sample size is therefore, } n = \frac{1.96 \times 1.96 (0.75 \times 0.25)}{0.05 \times 0.05} = 288$$

In order to get equal representation in every campus, 15.8% was calculated from all the workers at a Campus. The researcher ensured that there was proportional gender balance in each category of the workers and involved members of the management, teaching and non-teaching staff. The distribution was also made for each section within the working areas. A proportionate sampling method was used for each campus.

Table 3.1: sample size per campus

SNO	Name of campus	Population of workers	Sample size	Percentage of total sample size
1.	Njoro main Campus	764	120	41.7
2.	Nakuru town Centre	447	70	24.4
3.	Nakuru town campus	502	80	27.4
	Faculty of health Science	119	18	6.5
TOTAL		1832	288	100 %

3.5 Research Instruments

Data were gathered in various ways, primarily through structured interviews with a range of workplace personnel, including senior managers, line managers and supervisors. Other subjects included safety and health representatives, safety and health committee members, and employees. The other instruments included structured self-administered questionnaires and also checklists. Documents were examined or collected on all aspects of safety and health where relevant, both as a source of information and to verify the interview data. In most cases, workplace inspections assisted the verification process and provided an opportunity to speak to employees. In a number of workplaces, further information on how safety and health management works in practice was gleaned from observing safety and health committees in action.

3.6 Data processing and analysis

Data were cleaned, coded and entered in a data base for processing

Data in this study were analysed using descriptive statistics including frequencies and percentages. Data was cleaned, entered, coded and summarised based on objectives where necessary. Some data were analysed qualitatively using content analysis.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter is about the study data presentations, interpretations and discussions. The presentations were done using pie charts, bar graphs and tables. The main purpose of carrying out this study was to evaluate the state of occupational safety and health management systems at public universities in Kenya. The study sought to evaluate the sources and types of hazards encountered by workers at Public Universities, determine the level of implementation of Occupational Safety and Health Management System as a tool for managing hazards and to investigate the factors that influence implementation of the systems.

4.2 Response rate

From the data collected, out of the 288 questionnaires administered, 282 were well filled and returned. The six remaining questionnaires had incomplete information which could have affected the results and hence were not used. This represented a 97.92% response rate, which is considered very good to make conclusions for a study. According to Mugenda and Mugenda (2003), 50% response rate is adequate, 60% good and above 70% rated very good. Basing on this assertion, the response rate in this case of (97.9%) was very good

The high response rate was attributed to the data collection procedures, where the researcher personally administered questionnaires and waited for the respondents to complete before collecting the completed questionnaires forms. This ensured that no participant left with the questionnaires. The participants had also been adequately sensitized about the exercise.

4.3 Reliability analysis

The questionnaire had 20 items for the respondents to answer. Based on their feedback, Cronbach's alpha was calculated. Cronbach's alpha is a measure of internal consistency,

that is, how closely related a set of items are as a group. It requires that for reliability of the study tool ranges between 0-1 where by scales of 0.7 and above has been indicated to have an acceptable reliability coefficient. Scales of 0.3-0.7 have been indicated to have an acceptable reliability coefficient but lower thresholds are sometimes used in the literature

4.4 General computation Information

The study sought to compare various variables to determine how they correlated. In order to achieve this, the study used Pearson's Product Moment Correlation (PPMCC). This compares how closely two variables are related. The stronger the association of the two variables, the closer the Pearson Correlation Coefficient, r , will be to either +1 or -1 depending on whether the relationship is positive or negative, respectively. Achieving a value of +1 or -1 means that all the data points are included on the line of best fit. The closer the value of r to 0 the greater the variation around the line of best fit. One advantage of r is that it is unit less, allowing researchers to make sense of correlation coefficients calculated on different data sets with different units.

4.4.1 Respondents gender distribution

It was found important to determine respondents' gender in order to ensure the gender balance. It was also necessary to consider gender because exposure to various hazards could cause different outcomes to different gender groups. The results of gender distribution are shown in

The findings indicated that the respondents profile comprised more males (55 %) than females (45. %). The study also established that at significant level of $r=0.01$, there was weak positive correlation ($r = 0.035$) between gender and the duration of work. The respondents who attributed illness at to work as indicated in **Table 4.1**. However there was strong negative ($r= -0.142$) correlation between those workers who suffered work related illness and the duration that they had worked at the university.

Table 4.1: Correlations between gender, duration of work, and illness at work

		Gender	Duration worked	Illness
Gender	Pearson Correlation	1	-.157**	.035
	Sig. (1-tailed)		.009	.297
	N	282	282	282
Duration worked	Pearson Correlation	-.157**	1	-.142*
	Sig. (1-tailed)	.009		.017
	N	282	282	282
Illness	Pearson Correlation	.035	-.142*	1
	Sig. (1-tailed)	.297	.017	
	N	282	282	282

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

4.4.2 Category of workers

In order to determine how different categories of workers were exposed to hazards, the respondents were categorized into 4 groups. These were, lecturers, office workers (including administrators, secretaries and messengers), technicians (who mainly worked in the laboratories) and general workers who included gardeners (for flowers), herders, farmers, construction workers and maintenance staff. **Table 4.2** shows the respondents response by various workers according to their categories. The composition in terms of gender was harmonious for most of the groups except for the lecturers where men were more (60.2%) than women (39.8%). There were more male office workers (55.7%) than females (44.3%)

Table 4.2: summary of respondent's category of workers

Category	Males	Females
Teaching staff (n=98) (34%)	59 (60.2%)	39 (39.8%)
Office workers (n=79 (28.0%))	44(55.7%)	35 (44.3%)
Technicians (n=74) (26.2%)	38 (51.4%)	36 (48.6%)
General workers (n=31) (11%)	14 (45.2%)	17 (54.8%)
TOTAL N=282(100%)	N=155(55%)	N=127(45%)

4.4.3 Age distribution

The study found it necessary to determine age distribution among the respondents. This was in order to determine if there was age variation of the study findings based on age.

Figure 4.1 below gives the summary of respondents' age category.

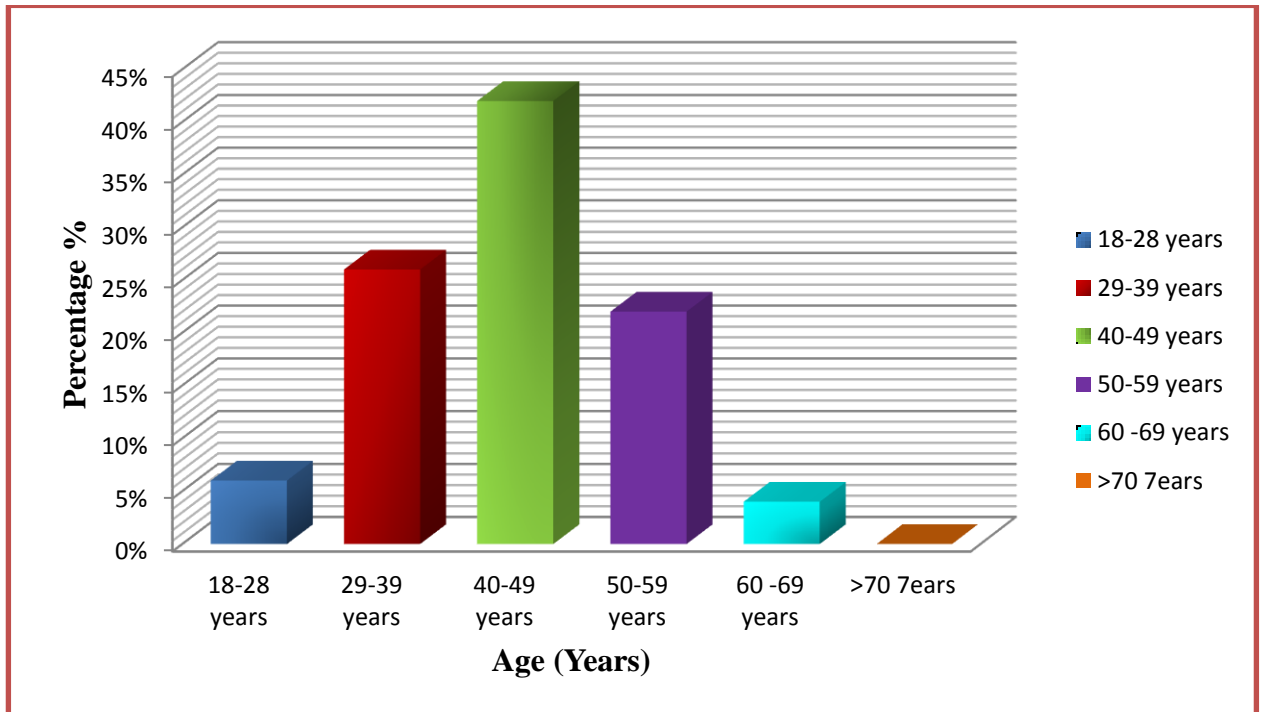


Figure 4.1: Summary of respondent's by age category (n=282)

Majority (42%) of the respondents were in age category 40-49 years. This finding concurs with the Kenya Demographic Health Survey (2010) report which shows the highest age of employed professionals, technical and managerial workers fell under this age bracket (KDHS, 2008-09). This was followed by 26% of age category 29-39 years, 22% ranging between 50-59 years, 6% ranging between 18-28 years and only few 4% were 60-69 years and there was no respondent who was above 70 years. This means that majority of responses from the respondents could be relied upon to make study conclusions.

The statistical analysis done using Pearson's Product Moments Correlations with the level of significance at $r = 0.01$ showed that there was a significant ($r = - 0.58$) relationship between respondents who attributed their illness at work place with the age. There was also significant ($r = 0.588$) relationship between age of respondents, duration they had worked at the university and illness at work.

4.4.4 Marital status

The study also sought to determine the marital status of the respondents. This was necessary in order to determine if their marital status contributed to psychosocial hazards at the work place. Some hazards like psychosocial can be as a result of family issues rather than the work they were engaged in. According to the findings presented in **figure 4.2**, Majority of the respondents (62%) were married while only a minority (6%) had divorced. It was not easy to establish whether they divorced before they were employed or after as this was not within the scope of the study.

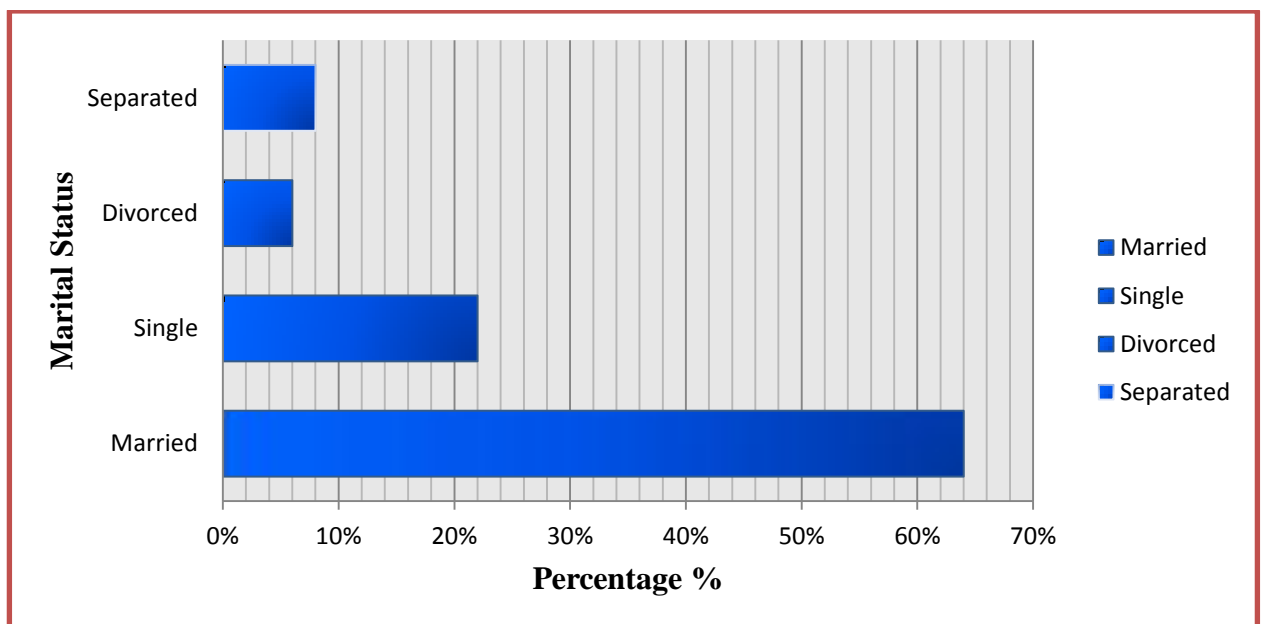


Figure 4.2: Summary of respondents' marital status (n=282)

Majority of the respondents were married representing 64%, followed by 22% who were single, 8% separated with minority 6% indicating divorced. This conformed to the findings on age bracket that most of the workers at Egerton University were at their mid age and therefore married representing the highest percentage of the sample. Statistically as shown in **Table 4.3** there was a positive relationship ($r= 0.075$) between marital status and illness at work when the level of significance is set at $r=0.05$. However, there was a negative significant ($r=-0.208$) relationship between marital status and duration worked at the university with the level of significant set at $r=0.01$.

Table 4.3: Correlations between age, illness, duration of work and marital status

		Age	Illness	Duration worked	Marital status
Age	Pearson Correlation	1	-.058	.588**	-.322**
	Sig. (1-tailed)		.192	.000	.000
	N	282	282	282	282
Illness	Pearson Correlation	-.058	1	-.142*	.075
	Sig. (1-tailed)	.192	.017	.017	.129
	N	282	282	282	282
Duration worked	Pearson Correlation	.588**	-.142*	1	-.208**
	Sig. (1-tailed)	.000	.017	.017	.001
	N	282	282	282	282
Marital status	Pearson Correlation	-.322**	.075	-.208**	1
	Sig. (1-tailed)	.000	.129	.001	.001
	N	282	282	282	282

** . Correlation is significant at the 0.01 level (1-tailed).

* . Correlation is significant at the 0.05 level (1-tailed).

4.4.5 Period worked at Egerton University

The duration that the respondent had worked at the university was considered. The importance of this was to determine whether the workstation/work site exposed to a particular hazard. According to Benjamin (2008), prolonged exposure to chemical hazards for example has been associated with some skin cancers. It was also necessary to ascertain the accuracy of the information provided by the respondent

Majority of the respondents had worked at the university for less than 5 years followed by those who had worked in the institution for 6-10 years representing 21% while 17.5% indicated that they had worked in the institution for above 20 years. This means that majority of the employees had worked in the institution for less than 5 years which may be attributed to various reasons beyond the scope of this study. This is fairly a short duration (5yrs) considering that the retirement age for non-teaching staff is 65years while that of the teaching staff is 70 years. The short duration of work at the University can also be attributed to atrocities where workers resigned to seek better remuneration elsewhere among other reasons. This represents a small proportion while 65% who have worked for more than 6 years and hence anadequate representation of the sample size.

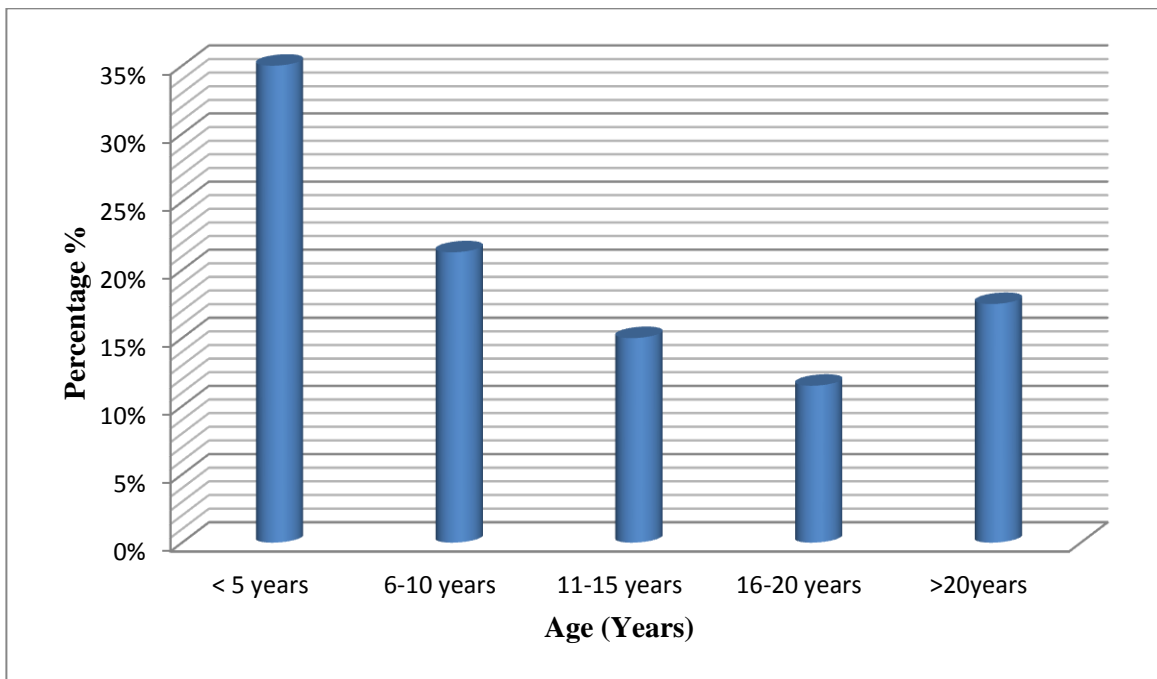


Figure 4.3: Duration worked at Egerton University (n=282)

As indicated in the **table 4.3** there was a weak negative significant ($r = - 0142$) between the duration thee respondents had worked in the university and illness at the work place with the level of the significance set at $r = 0.01$. There was also a negative correlation ($r = - 0208$) between duration worked at the university and marital status with the level of

significance set at $r = 0.05$

4.5 Sources and types of hazards

4.5.1: sources of hazards

One objective of the study was to determine sources and types of hazards encountered at the public universities. The findings were as indicated in **figure 4.4**.

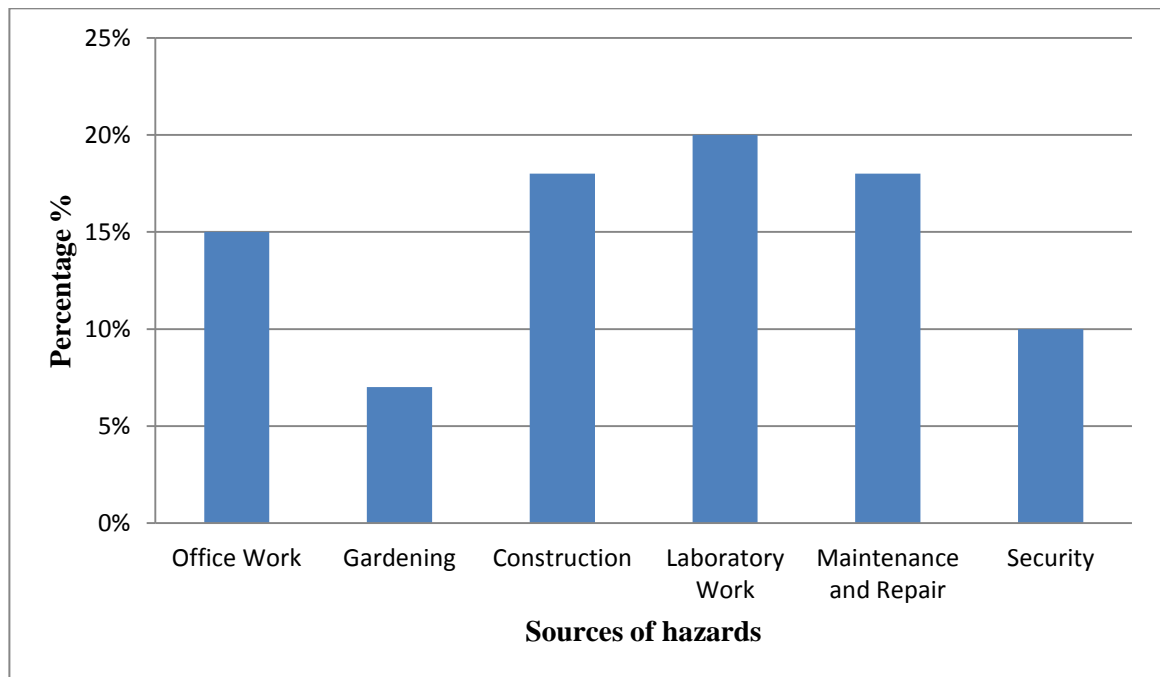


Figure 4.4: Sources of hazards (n=282)

The study found out that laboratory sector was the highest (20%) source of occupational hazards. These included teaching laboratories (like chemistry, physics, zoology, anatomy and Biochemistry laboratories), and service laboratories (like the hospital, dairy Horticulture). The second major source was construction and maintenance and repair (18%). The main activities that contributed to hazards from construction sites were during excavation and trenching. This finding correlates with observation made by the United States Bureau of Labor and Statistics (USBLS) which recorded 271 worker

fatalities in trenching and cave-ins.

With the expansion of the university to accommodate more students both as an own initiative and also as required by the ministry of higher education, Egerton university embarked on several constructions. Some of these included an anatomy laboratory cum mortuary and a new Faculty of Health Science complex among others. Office work was reported as the third highest with 15%. This can be explained by the fact that many of the workers at one point or the other have to use or visit offices. The office work included particulate matter from photocopiers, glare from unshielded computers, lack of ergonomic equipments and detergent used for cleaning the offices among others .some reported long working hours with no work shifts leading to monotony.

Hazards that were related to teaching arose from various sources including the use of chalk board in some lecture rooms that produced dust; crowded lecture theatres that made it stuffy and lack of rail guards at some storey buildings denying the use of three point contact for support. Egerton University carries out farming of various kinds. Some of these include, daily, wheat, maize, and horticulture. The study identified various hazards that emanated from these activities. This included, dust, poor working tools, inadequate tools where some were improvised to meet the daily expectations by workers, long working hours and lack of vaccination against zoonotic diseases of workers herding animals

4.5.2: Types of hazards

The study sought to find out the types of hazards encountered at public universities.

Figure 6 shows the different types of hazards identified and their proportion

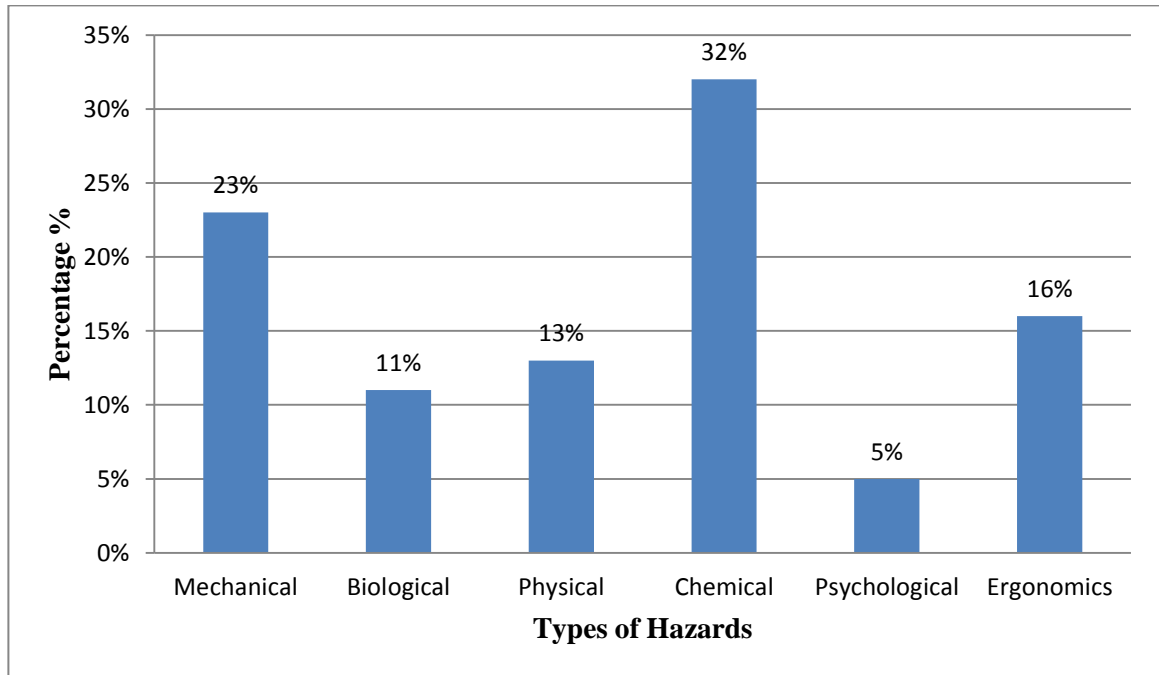


Figure 4.5: Types of hazards (n=282)

The types of hazards identified included; Chemical (32%), mechanical (23%), physical (13%), biological (11%), psycho-social (15%) and ergonomics (16%). The study identified various types of chemicals being used. At the offices, the chemicals were used as detergents to clean the floor, windows and working tables/ desks. At the teaching labs, various chemicals were used. Technicians and lecturers used precautionary safety measures when in the labs. All had aprons and those doing procedures had gloves on. Safety measures were also observed at the sanatorium where chemical reagents for various diagnostic tests were carried out.

Mechanical hazards were identified from workers in various sections and constituted .At the Estate department for instance where all the repairs were carried out, a number of workers were not using PPEs. This exposed them to risk of cuts, bruises, blisters soft tissue injuries and even fractures.

Physical hazards were identified among workers at the kitchen where the temperatures were high, some offices had dim light and ill ventilated. At the students Centre and also agricultural resource center hotel, workers indicated that temperatures were sometimes high. Respondents indicated that the temperatures at the department of dairy where there is a manufacturing firm for yoghurt and ghee were very low. The temperatures in this section are very low as required which may expose the workers to hypothermia and recurrent chest infections

The study identified biological hazards mainly at three areas. The first was the sanatorium where sick workers and students go for treatment. Although Blood safety measures were taken by various healthy workers, there were still chances for accidental needle stick injuries when taking blood samples or when injecting drugs. The second is due to overcrowded classrooms.

Despite concerted effort to provide its work force with proper and adequate working tools, the study identified ergonomic hazards. This contributed 16% of all the hazards encountered Workers in some sections complained of low back pain (LBP) due to prolonged sitting and uncomfortable chairs. Examples of these workers include lecturers who have big classes to teach and hence long marking hours, inadequate number of secretaries who have to accomplish work given to them and administrators who have to ensure compliance with ISO 9001 on management requirements and hence sitting for long hours.

The study identified hazards in all the classes. Chemical hazards were the main exposure affecting the workers at the university (32%). The male technicians (20%) were more affected than their female counterparts (16%). The explanation for this is because the number of male technicians is higher than that of female. This can also be supported by the fact that few males used personal protective equipments. The second common hazard was mechanical hazards (21%) This hazard was reported by both technicians and also general workers as the second common hazard. Female workers reported more incidences of this hazard as compared to the men. Ergonomic hazards cuts across all the groups in almost equal proportions. This can be attributed to inadequate working environment as shown in figure 13. Many workers were improvising tools / equipments in order to achieve required results while others used un-ergonomic tools.

Table 4.4 Summary of category of workers

Hazards	Teaching Staff		Office Workers		Technicians		General Workers	
	M	F	M	F	M	F	M	F
Mechanical n=59(21%)	2(3.4%)	3(5.0%)	0(0%)	3(5.0%)	13(2.2%)	16(27.1%)	9(15.4%)	13(22%)
Biological n=31 (11%)	0	0	3(9.7%)	5(16.1)	7(18.9)	4(12.9%)	5(16%)	7(18.9%)
Physical n=37 (13%)	2(5.5)	6(16.2)	4(10.8%)	7(18.9%)	3(8.1)	4(10.8%)	6(11.2%)	5(13.5)
Chemical n=90 (32%)	5(5.6%)	2(2.2%)	8(8.9%)	7(7.8%)	18(20)	15(16.7%)	12(13.3%)	2(23.3%)
Psychosocial n=14(5%)	0	0	2(14.3%)	4(28.6%)	0	1(7.1%)	4(38.6%)	3(21.4%)
Ergonomics n = (18%)	6(11.7%)	8(15.7%)	9(17.6%)	7(13.7%)	3(5.9)	6(11.8%)	5(9.8%)	6(18%)

Physical hazards were least reported (13%). Majority of those who reported the hazards were the general workers. None of the lecturers indicated that they had a pscho-social hazards effect that was related to their work. The reason for this is that the work environment of the teaching staff has improved greatly after implementation of the ISO, 9001.

4.5.3 Outcome of hazards

The study found it prudent to determine the outcomes of hazards encountered by workers. The findings were as indicated in **figure 4.6**.

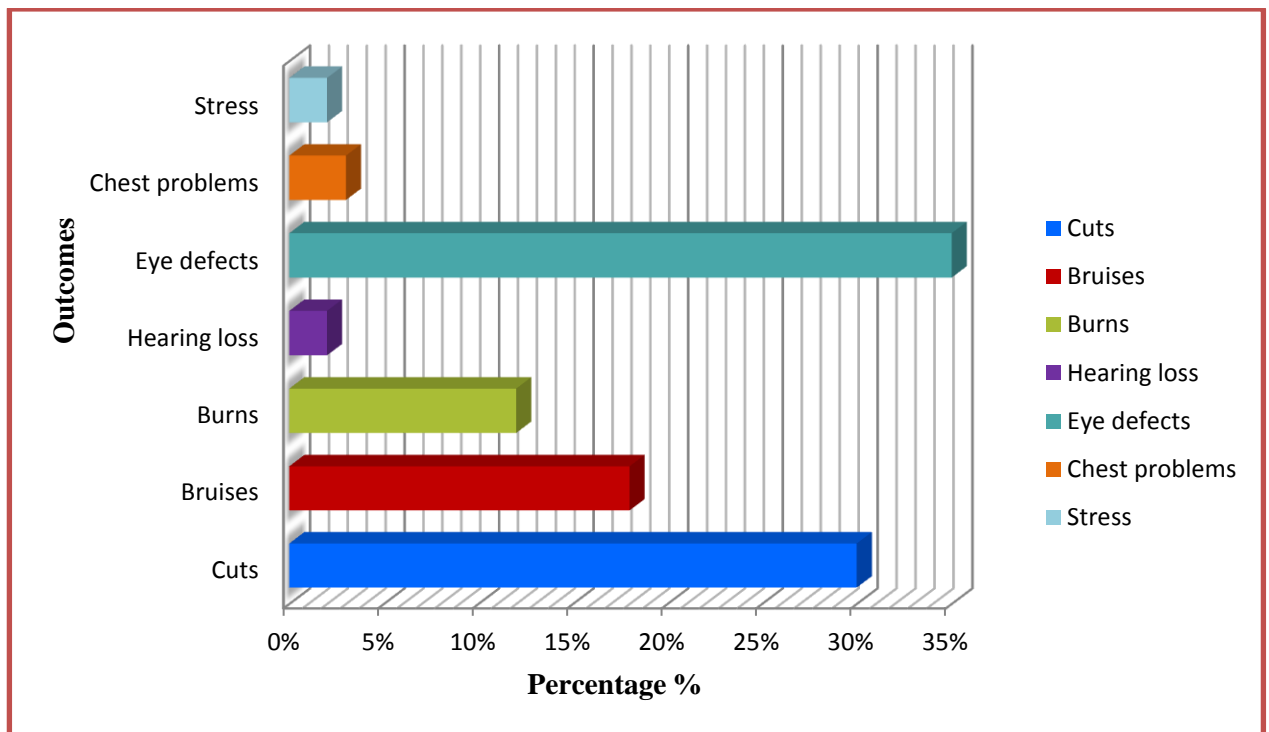


Figure 4.6: Distribution of outcome of hazards (n=282)

Respondents indicated that the major (35%) type of hazard was eye defects, followed by cuts. Further 18% indicated bruises, while 12% indicated burns with few indicated chest problems (3%), hearing loss (2%) and stress (2%) respectively. This implies that they do not observe protective measures. The employer may not have provided computer screens and the worker should endeavor to use anti-glare - goggles e.g. computer screens, gumboots, gloves etc. The number that indicated eye defects are due to embracement of

the use of computers for office work and also teaching. However if the computers were fitted with anti-glare screen, the levels might have been lower. The other possible explanation is that majority of workers after the age of 40 are prone to eye problems as an aging process. The low level of hearing loss is due to the low levels of the number that indicated that noise was hazardous to the

Table 4.5: Summary of outcome of hazards for different category of workers

Outcome	Teaching staff		Office Workers		technicians		General Workers	
	M	F	M	F	M	F	M	F
Stress n=17(6%)	2 (11.8%)	1(5.9%)	2(11.8%)	4(23.5%)	0(0%)	1(15.9%)	3 (17%)	4(23.5%)
Chest problems n=8(3%)	0 (0%)	0(0%)	28(12.5%	14(25%)	0 (0%)	0(0%)	3(37.5%)	2(25%)
Eye defects n=79(28%)	32(40.5%)	18(22.%)	2(2.5%)	12(15.2%)	6(7.6%)	4(5.1%)	4(5.1%)	3(3.8%)
Hearing loss n=6 (2%)	0 (0%)	0(0%)	1(16.7%)	0(0%)	1(16.7%)	2(33.3%)	2(33.3%)	0(0%)
Burns n=23 (8%)	0 (0%)	0 (0%)	0 (0%)	1(4.3%)	3(13.0%)	4(17.4%)	7(30.4%)	8(34.8%)

Majority of those who suffered chest problems were general workers (37.5%) for male and (25%) for females and office workers(12.5%) for males and (25%) for females. This can be explained by the fact that the general workers were exposed to dust while the environment for the office workers was cold and hard particulate matters from the photocopiers. Majority of the lecturers suffered eye problems (32%) as opposed to general workers. As much as the office workers who reported having developed eye defect were not many, majority of those who reported (15.2%) were females. Hearing loss was reported least cumulatively (2%) but majority (33.3%) of those who reported were general workers. Burns was the second least (8%) reported and the majority of those affected were also the general workers.

4.6 Level of implementation of Occupational Safety and Health Management Systems

4.6.1 Introduction

The study established the level of implementation of occupational safety and health management systems at the university as indicated in **figure 4.6**. This was done by determining the level of each component as required. The study also sought several other undertakings including; measures that were taken when a worker fell sick at the work site, adequacy and efficiency of working tools, and working environment. The other information that was sought by the study was the outcome of the hazards, the relationship of work to illness, and the provision of PPEs. This section also addressed determined when and how often medical examination were done and those who were involved.

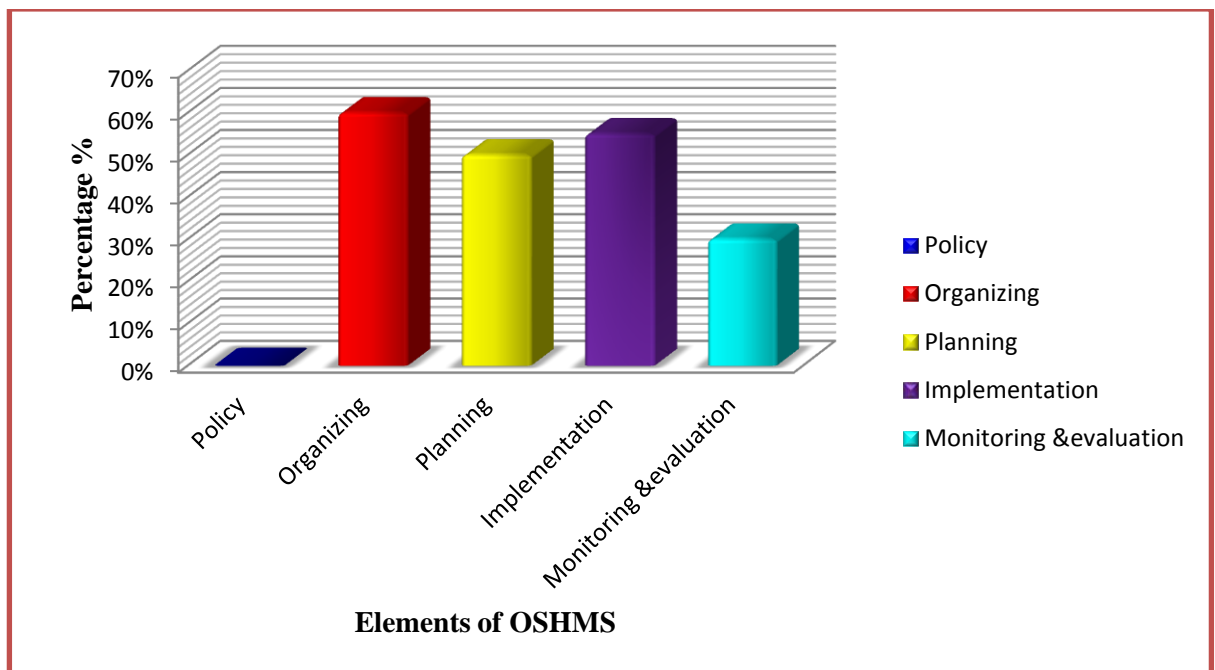


Figure 4.7: Summary of level of implementation of OSHM system (n=282)

From the findings in **Figure 4.7**, the state of organizing component of Occupational Safety and Health systems was at 60%, followed by 55% for implementation, and 50%

and 30% being the level of planning and monitoring and evaluation respectively. There was no OSH policy that was operational.

The study found out that the policy was at draft level waiting to be ratified by the university council and the implemented. Absence of a written and publicized policy on safety and health is a drawback to implementation of OSHMS. The other implementation components were done in unstructured manner due to lack of a policy document. While there was a safety and health committee in place, it was not well coordinated. The legal requirements as per the Occupational safety and health Act (GOK, 2007) that the committee be headed by a senior member of the university management in the rank of Deputy Vice Chancellor, was also not observed as it was headed by a Senior Administrative Registrar. Planning and implementation was done in unstructured manner because the guiding document (OSH Policy document) had not been adopted. Investigations on accidents were not detailed because of lack of laid down guidelines and lack of trained personnel to do it.

4.6.2 Measures taken in case a worker fell ill at work place

The study further sought to find out the measures that the employer undertook for those employees who fell sick at the place of work. This was meant to determine if the employer had put measures in place in case workers developed illness at the place of work and whether the workers were aware of what to do to such an employee. The findings were as indicated in **figure 4.8**.

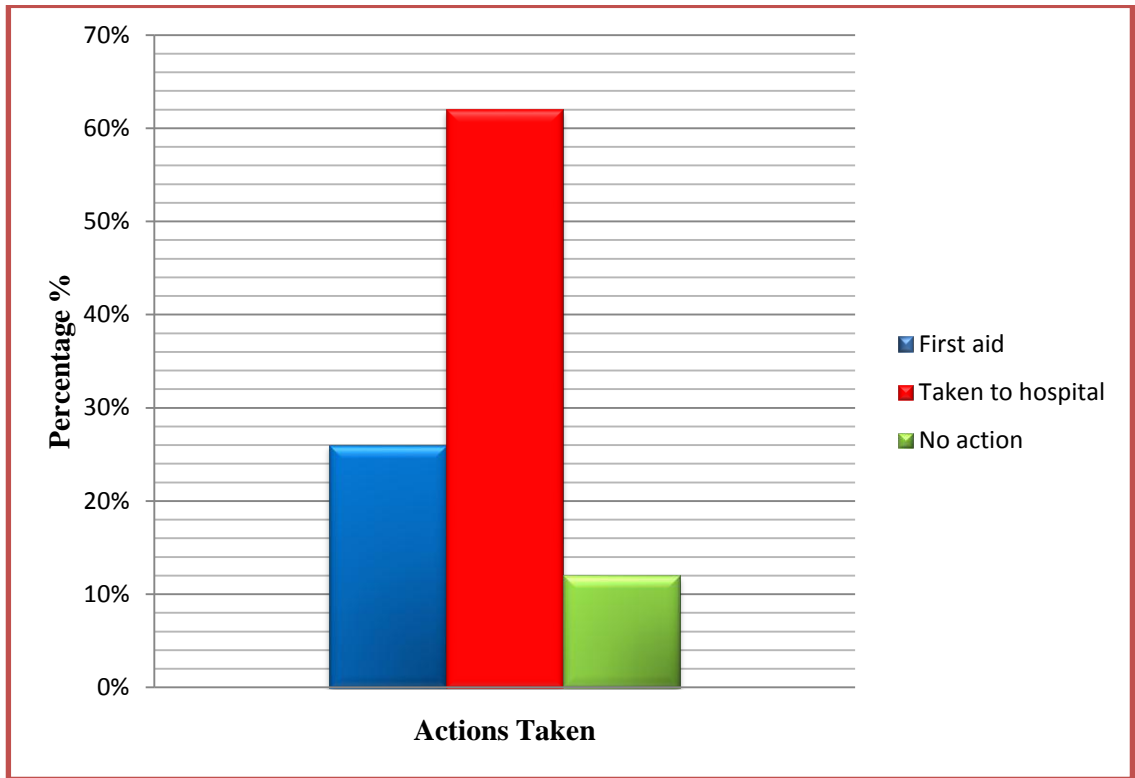


Figure 4.8: Summary of measures taken in case a worker fell ill at workplace (n=282)

From the findings, majority (62%) indicated that they were taken to hospital and 26% indicated that they received first aid. Few (12%) respondents indicated that there was no action taken when they fell sick. This implies that employers were concerned about the illness developed by their employees and action was taken immediately except for few (12%) cases where action was not taken at all. These findings are supported by (OSHA, 2007) that worker participation is an essential element of the OSH management system at the university. As required by law, the employer ensures that workers and their safety and health representatives are consulted, informed and trained on all aspects of OSH, including emergency arrangements, associated with their work. The employer makes arrangements for workers and their safety and health representatives to have the time

and resources to processes of organizing, planning and implementation, evaluation and action for improvement of the OSH management systems (GOK, 2007)

4.6.3 Adequacy of working machines, tools or equipments

In order to provide a better understanding of occupational safety and health management system, the study sought to find out if there were adequate working tools or equipments and their working conditions.

From the findings majority (68%) indicated that the working machines, tools or equipments were inadequate at their work site. 32% indicating that there were adequate working tools and equipments at the work place. Workers who did not have adequate machines, tools or equipments were forced to improvise with un-ergonomic tools or equipments and hence exposing them to mechanical hazards. Statistically as shown in **Table 4.6** there was significant negative relationship between adequacy of tools ($r = -0.223$) and relationship to illness at work with the significance level set at ($r = 0.05$). This means that as the provision of the tools decreases the number of ailments at work place increases. There was also a weak significance between adequacy of tools and use of PPE.

Table 4.6: Relationship between adequacy of tools and illness at the work place

		Ill at work	Tools Adequacy	Use of PPE
Ill at work	Pearson Correlation	1	-.223**	-.039
	Sig. (1-tailed)		.002	.321
	N	282	282	282
Tools Adequacy	Pearson Correlation	-.223**	1	.175*
	Sig. (1-tailed)	.002		.012
	N	282	282	282
Use of PPE	Pearson Correlation	-.039	.175*	1
	Sig. (1-tailed)	.321	.012	
	N	282	282	282

** . Correlation is significant at the 0.01 level (1-tailed).

4.6.4 Efficiency of machines, tools or equipment at workplace

The study sought to determine the level of efficiency of the working machines, tools or equipments in order to determine if they met the occupational safety and health management system standards. From the findings, majority (54%) rated the efficiency of their working tools and equipments as good, 42% rated their working machines as fair with only few 4% rating their working machines tools or equipments were excellent. This implies that a workplace hazard identification and risk assessment are carried out before any modification or introduction of new work methods, materials, processes or machinery. Such assessment should be done in consultation with and involving workers and their representatives, and the safety and health committee, where appropriate. The

implementation of a "decision to change" ensures that all affected members of the organization are properly informed and trained in Emergency prevention, preparedness and response, Emergency prevention, preparedness and response arrangements is established and maintained. These arrangements identify the potential for accidents and emergency situations, and address the prevention of OSH risks associated with them. The arrangements is made according to the size and nature of activity of the organization by; ensuring that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite; providing information to, and communication with, the relevant competent authorities, and the neighborhood and emergency response services; addressing first-aid and medical assistance, firefighting and evacuation of all people at the worksite; providing relevant information and training to all members of the organization,at all levels, including regular exercises in emergency prevention, preparedness and response procedures (OSHA, 2007).

Table 4.7: Relationship between respondents on efficiency of work, use of PPES and illness at work

		Ill at work	Use of PPE	Efficiency of Tools
Ill at work	Pearson Correlation	1	-.039	.003
	Sig. (1-tailed)		.321	.485
	N	282	282	282
Use of PPE	Pearson Correlation	-.039	1	-.037
	Sig. (1-tailed)	.321		.316
	N	282	282	282
Efficiency of Tools	Pearson Correlation	.003	-.037	1
	Sig. (1-tailed)	.485	.316	
	N	282	282	282

From the study there a negative significance ($r = 0.037$) between efficiency of tools used by the respondents and those who fell ill at work. However there was a positive correlation ($r=0.316$) between efficiency of machines and use of PPES. There was a negative ($r = - 0.39$) relationship between those who fell ill at work place and use of PPE.

4.6.5 Rating of working Environment

The study further sought to find out employees' perception and how they rated the work site environment. This was aimed at determining the employees' perception of their work place environment as a motivating factor to their work. From the findings, majority (62%) rated their work environment to be good with (36%) rating their work environment as fair and only few(2%) rated their work environment as excellent. This

implies that the institutional work place environment is generally good according to the perception of the employees. The university has improved the working environment as a requirement of ISO: 9001 policy requirements

Table 4.8: showing correlations between work environment, illness use of PPEs and training on OSH

		Work environment	Illness	Use of PPE	Training on OSH
Work environment	Pearson Correlation	1	-.044	-.076	.131*
	Sig. (1-tailed)		.257	.161	.026
	N	282	282	282	282
Illness	Pearson Correlation	-.044	1	-.092	-.085
	Sig. (1-tailed)	.257		.115	.101
	N	282	282	282	282
Use of PPE	Pearson Correlation	-.076	-.092	1	-.106
	Sig. (1-tailed)	.161	.115		.085
	N	282	282	282	282
Training on OSH	Pearson Correlation	.131*	-.085	-.106	1
	Sig. (1-tailed)	.026	.101	.085	
	N	282	282	182	282

The study showed that there was a negative significance ($r = -0.44$) between the environment that the respondents worked and the illness at work with the significance level set at $r < 0.05$. The findings also indicate a negative correlation ($r = -0.76$) between the work environment and the use of PPE. However there was a positive ($r = 0.131$) correlation and training of workers on occupational safety and health. That means that as the numbers of workers are trained the working environment improves

4.6.6 Workers who fell ill at work place

In order to assess the level of safety and health training of the workers, the study sought to find out if the respondents had ever fallen ill at their work place and the action that was taken at the work site. According to OSHA, 2007 workers should be trained regularly on safety issues like first aid, fire safety, safe handling of machines among other trainings. This was aimed at finding out the safety and health issues associated with occupation of the respondents.

From the findings majority 62% indicated that they had fallen ill at their place of work, while 38% indicating that they had never fallen ill at their place of work. This implied that illness at the place of work was a common experience to many employees.

Table 4.9: Relationship between illness, age, gender and use of PPE

		Illness	Gender	Age	Use of PPE
Illness	Pearson Correlation	1	.035	-.058	-.092
	Sig. (1-tailed)		.297	.192	.115
	N	282	282	282	282
Gender	Pearson Correlation	.035	1	-.179**	.108
	Sig. (1-tailed)	.297		.003	.079
	N	282	282	282	282
Age	Pearson Correlation	-.058	-.179**	1	.051
	Sig. (1-tailed)	.192	.003		.255
	N	282	282	282	282
Use of PPE	Pearson Correlation	-.092	.108	.051	1
	Sig. (1-tailed)	.115	.079	.255	
	N	282	282	282	282

As shown in table 4.9, there was significant ($r = 0.35$) positive relationship between gender and illness at work with the significant level set at 0.01. There was also a significant negative ($r = -0.58$) correlation between age and those who fell ill at work. This means that the older respondents were more likely to fall ill at their work places.

4.6.7 Relationship of illness to the employees' work

Further the study sought to determine from those who indicated that they had fallen ill at the place of work if they related the illness to the work that they do. From the findings majority of the respondents (67%) indicated that the illness they suffered did not relate to the work they did while 33% indicated that the illness had a relation with the work they do. This explanation is backed by the respondents who rated the work environment to be good (62%) and also those who stated that working tools and equipments were good (54%)

This concurs with Benjamin (2008) that exposures to the risk are not inevitable but arise from how work is organized. The workplace is full of many types of health and safety hazards, and exposure to these hazards can be harmful, and sometimes fatal, to employees.

Health hazard exists when a person comes in contact with any agent whose properties can cause harm to the body when excessive exposure takes place. Workplaces hazards generally differ from those found in the environment and are therefore a threat to a large proportion of the world's population. Workplaces can expose employees to hazardous materials or chemicals, some of which can be immediately harmful, while others can have destructive effects years later (Benjamin 2008). Health care and scientific research jobs may expose employees to hazards, for example, just as construction jobs in the 20th century often exposed workers to asbestos, which was partially banned in 1989 after it was determined to be a carcinogen.

Table 4.10: Relationship between illness , work , gender, age, and PPE

		Illness	Gender	Age	Use of PPE	Ill at work
Illness	Pearson Correlation	1	.035	-.058	-.092	.065
	Sig. (1-tailed)		.297	.192	.115	.197
	N	229	229	229	171	177
Gender	Pearson Correlation	.035	1	-.179**	.108	.060
	Sig. (1-tailed)	.297		.003	.079	.213
	N	282	282	282	282	282
Age	Pearson Correlation	-.058	-.179**	1	.051	-.068
	Sig. (1-tailed)	.192	.003		.255	.184
	N	282	282	282	282	282
Use of PPE	Pearson Correlation	-.092	.108	.051	1	-.039
	Sig. (1-tailed)	.115	.079	.255		.321
	N	282	282	282	282	282
Ill at work	Pearson Correlation	.065	.060	-.068	-.039	1
	Sig. (1-tailed)	.197	.213	.184	.321	
	N	282	282	282	282	282

** . Correlation is significant at the 0.01 level (1-tailed).

From the study findings there was a strong positive correlation ($r=0.65$ between the respondents who related their sickness to the work they did. The discrepancy between respondents who fell ill at work (62%) and those who did not attribute to work means that the respondents developed ailments to other factors other than at work place . If regular medical examinations were carried out as required by Occupational safety and health Act, 2007, early detection of these ailments would have been detected.

4.6.8 Personal protective equipment

In order to accomplish the main purpose of the study on occupational safety and health

management system, the study sought to find out if the respondents were provided with personal protective equipment at their place of work. Statistically, as indicated in table 11, with the level of significance set at $r = 0.01$ there was a positive significant positive relationship between PPE and illness ($r = 0.115$), gender ($r = 0.79$), age ($r = 0.225$) and illness at work ($r = 0.321$). This casts doubt on the effectiveness of the PPE Used

From the findings, majority (68%) of the respondents indicated that they do not have personal protective equipment with only few 32% indicating that they had personal protective measures. This contradicts ILO-OSH, 2001 which stipulates that hazards and risks to workers' safety and health are identified and assessed on an ongoing basis. Preventive and protective measures are required to be implemented in the following order of priority: Elimination of hazards at the source, through the use of engineering controls, administrative control measures, and where residual hazards cannot be controlled by collective measures, the employer provides for appropriate personal protective equipment, including clothing and implement measures to ensure its use and maintenance. (ILO, 2001). Hazard prevention and control procedures or arrangements are required to be established adapted to the hazards and risks encountered by the organization, be reviewed and modified if necessary on a regular basis, and comply with national laws and regulations, and considers the current state of knowledge, including information or reports from organizations, such as labour inspectorates, occupational safety and health services, and other services as appropriate.

4.6.9 Medical examination on employment

The study sought to establish if the respondents were conducted medical examination on employment as part of the occupational safety and health management system implementation requirement. From the findings majority (82%) indicated that they were conducted medical examination on employment with only few 18% indicating that they were not done. Whereas the pre-employment medical examination is rated high, the frequency of medical examination was low According to OSHA, 2007 it is recommended that medical examination be carried out after change of job, use of new

machines and equipments, after workers had returned from sick off and as a routine as recommended by the OSHA, 2007. From **table 4.11** it is evident that there is a positive significant correlation between medical examinations on employment

($r = 0.109$) and illness at work ($r = 0.44$) with the level of significant set at $r = 0.01$. The study also established that there was significant negative correlation between medical examination and age of the respondents ($r = -0.044$)

Table 4.11: Relationship between medical examination, frequency of medical examination, illness at work and age

		Done Med Exam	Frequency of med Exam	Illness	Age
Done Med Exam	Pearson Correlation	1	-.199**	.109	-.044
	Sig. (1-tailed)		.001	.051	.254
	N	282	282	282	282
Frequency of med Exam	Pearson Correlation	-.199**	1	-.022	-.031
	Sig. (1-tailed)	.001		.372	.319
	N	282	282	282	282
Illness	Pearson Correlation	.109	-.022	1	-.058
	Sig. (1-tailed)	.051	.372		.192
	N	282	282	282	282
Age	Pearson Correlation	-.044	-.031	-.058	1
	Sig. (1-tailed)	.254	.319	.192	
	N	282	282	282	282

This implies that as a requirement of occupational safety and health management

system, medical examination is important to know if employees are fit to carry out certain jobs as far as their safety and health is concerned

4.6.10 Frequency of medical examination in a year

The study further sought to determine how often is medical examination done on employees in a year in order further to understand if the occupational safety and health management system implementation is a continuous process. The findings were as indicated in **figure 4.9**.

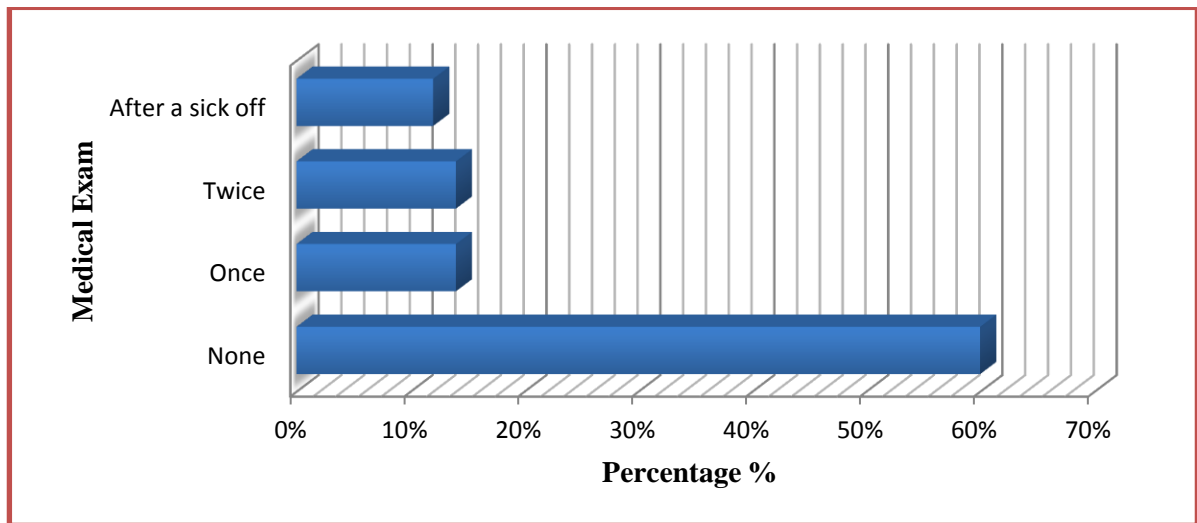


Figure 4.9: Summary of frequency of annual medical examination (n=282)

From the findings in **figure 4.9**, majority 60% of the respondents indicated that they had not been examined at any point in a year. Failure to carry out medical examination makes it difficult to know if a patient contracted illness outside the university or at the work place. This was, followed by 14% who indicated that they had been examined once and twice respectively in a year. Few respondents (12%) indicated that they had been examined after a sick off. From **table 4.11**, statistically it is evident that there is negative weak relationship between frequency of medical examination and illness ($r = -0.022$). From the study there is also a stronger negative relationship between the frequency of medical examination and the age ($r = -0.31$

4.7 Factors affecting implementation of OSHMS

The study further found it necessary to determine the factors that affected implementation of occupational safety and health management systems. The findings were as indicated that majority (28%) indicated inadequate resources as the major hindrance to full implementation of occupational health and safety management system, followed by 25% indicating limited knowledge on OSH requirement, 20% indicating inadequate financial support from the management, 14% indicated low awareness and only 13% indicated that few people trained on OSH. This implies that resources, knowledge and support from the management are very crucial in the implementation of occupational health and safety management system. Resource allocation like resources and personnel for implementation of OSH management system are of importance. According to OSHA, 2007 all the workers are expected to know the safety and health requirements and comply with the law. Only 25% of the respondents were aware about these requirements. The level of those trained on aspects of OSH was also very low at 13%. This causes low awareness (14%) of the safety and health measures at the workplace. The safety culture of the community was also low as some people were not concerned about their working environment and attitude towards safety was negative. Despite enough financial resources for OSH, there were no structures for implementing OSHMS at the university. The focus was more on worker compensation than prevention and control of the hazards.

4.7.1 Occupational Safety and Health Training

Safety and health training forms a core component in the implementation of occupational safety and health management systems. It enlightens the workers on the current occupational safety and health management issues and how safety and health at the work place can be improved. From the findings, majority (88%) indicated that they had not attended any training on safety and health with only few (12%) indicating that they had gone for training. This implies that majority of employees are likely to be ignorant in occupational safety and health management system implementation process

due to lack of training on emerging health and safety issues in work place. This is in contrary with occupational safety and health management system standards that a workplace hazard identification and risk assessment are carried out before any modification or introduction of new work methods, materials, processes or machinery. Training is done if a new machine is introduced, change of an employees work site and as new technology comes in among others. The arrangements is made according to the size and nature of activity of the organization by; ensuring that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite; providing information to, and communication with, the relevant competent authorities, and the neighborhood and emergency response services; addressing first-aid and medical assistance, firefighting and evacuation of all people at the worksite; providing relevant information and training to all members of the organization, at all levels, including regular exercises in emergency prevention, preparedness and response procedures. (GOK, 2007)

4.7.2. Relationship of training duration of work, and illness

From the study, table 12 on page 65 shows that at significance level of $r = 0.05$ there is weak negative correlation ($r = - 0.060$) between the duration that the respondent had worked at the university and training. From the results there was also a weak relationship between training on OSH and illness at work place ($r = - 0.085$). This means that the training has no direct correlation with illness at work. According to OSHA 2007 workers are supposed to be trained with introduction of new technology, change of working area or when there are new updates. However there is also significant negative relationship between duration worked at the university and falling ill at the work place ($r = - 0.142$)

Table 4.12: Relationship between duration worked, illness and training on OSH

		Duration worked	Illness	Training on OSH
Duration worked	Pearson Correlation	1	-.142*	-.060
	Sig. (1-tailed)		.017	.189
	N	282	282	282
Illness	Pearson Correlation	-.142*	1	-.085
	Sig. (1-tailed)	.017		.101
	N	282	282	282
Training on OSH	Pearson Correlation	-.060	-.085	1
	Sig. (1-tailed)	.189	.101	
	N	282	282	282

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This chapter summarizes the study and makes conclusions based on the results of the study and recommendations that are made from the conclusions. The conclusions are derived from the findings of the study while the recommendations are based on the conclusions

The findings from this study indicate that the level of implementation of Occupational Safety and Health Management system as a tool for dressing hazards is low. This is attributed to the fact that there is no Policy document on Occupational Safety and Health which serves a guide for implementation of OSH Management system and inadequate allocation of resources

On presence of hazards the study concludes that chemical hazards are the commonest (32%) types of hazards at public universities in Kenya. The sources of these are mainly from the laboratories (20%). The most predisposed category of workers was the technicians. Other hazards identified from the study include: Mechanical (23%) also commonly affecting technicians, Biological (11%) Psychosocial (5%), Physical (13%), and Ergonomic (16%). The magnitude of employee exposure to hazards varies from one type and source to another. This is attributed to inadequate and unstructured manner in which occupational safety and health management system is implemented. From the study various factors led to this scenario were identified. There was a strong correlation between training, working environment and the use of personal protective equipment

5.2 Recommendations

This study recommends that Occupational Safety and Health Policy Guidance document be ratified, adopted and communicated to all the stake holders as required by law to serve as a guide for managing hazards at the University.

In order to implement OSHMS and also as a legal requirement, the University should encourage establishment of occupational safety and health committee which. The committee should be headed by a person at the level of Deputy Vice Chancellor and have representation at all the University sections distributed in all the campuses. The committee should embark on eliminating the hazards using the engineering controls, substitution of harmful substances with lesser harmful ones, isolation and administrative controls. The university should further come up with ways of enforcing the use of personal protective equipment.

The study further recommends that training of all workers on OSH be done as per the OSHA, 2007 regulations. The training will increase awareness of OSH among workers, increase worker participation in safety and health, minimize morbidity and ultimately increase the productivity. Medical examination should be done on employment, after sick off and routinely as the law requires.

Further studies should be done to compare other models used for safety and health management at organization level in view of adopting a simpler, effective and one that is flexible to allow innovation while still complying with OSHA, 2007

REFERENCES

- Anthony D., and La Montagne (2001)**, Centre for the Study of Health & Society School of Population Health, University of Melbourne Melbourne.
- Armstrong, M., (2001)**.*A handbook of Human Resource Management Practice*, 8th Ed., London United Kingdom,
- Barasa, F., (2014)**. Community Participation in Development- A Social Economic Analysis of the Benefits of a Devolved Decision Making Process in Kenya. *International journal on current trends in research* India, New Delhi, page 168-172
- Benjamin O. Ali., (2008)**.*Fundamental Principles of Occupational Safety and Health*, 2nd edition, ILO Office Switzerland.
- British Standards Institution (1999)**.Occupational Health and Safety Assessment System 18001, Occupational Health and Safety Management Systems Specification, British Standards Institution London, UK,
- Diana C., (2012)**. Occupational Risk at Jua Kali industry in Eldoret, Kenya, *African Newsletter on Occupational Safety and Health*, Helsinki, Finland
- Dell, G. (2000)**, Current Safety Management Practice: Does a Systematic Approach Deliver? Paper presented at the First National Conference on Occupational Health and Safety Management Systems, UWS, Sydney
- Stanford University, (2002)**. Environmental Health and safety, 2002 California, USA
- GOK, (2007)**. The Kenya's Vision 2030, Popular Version, Government Press Nairobi Kenya..
- GOK, (2009)**. The National Policy for Disaster Management, Policy, Legal and Institutional Arrangements, Ministry of special programs, Government Press, Page 29. Nairobi Kenya.
- GOK, (2007)**. The Occupational Safety and Health Act, 2007, Government Press, Nairobi Kenya Gazette Supplement no. 111
- GOK, (2014)**. Commission for university, university standards and Guidelines, government press, Nairobi Kenya

Golddenhar and Linda (2001). Intervention Research Process in Occupational Safety and health: An Overview from National Occupational Research Agenda Intervention Effectiveness Team, *Journal on Occupational and Environmental Safety and Health*, Lippincott Williams & Wilkins, Inc. Vol. 43, issue 7, Page 616-622

Health and Safety Executive, (2001). Health and Safety Performance Measurement, London, United Kingdom

Internet,<http://www.google>

ILO, (2001). Guidelines on occupational health and safety management systems, Switzerland

ILO-OSH, (2001). Guidelines on Occupational Safety and Health Management Systems, International Labour Office, Geneva.

ILO., (2004). Report on the first conference on health and safety, Geneva Switzerland
News sletter on occupational Health and safety, Helsinki, Switzerland Vol. 22 no. 2,

James, A. (2001). Effective occupational safety and health management system, *Integration of occupational health and safety assesment series18001*, Switzerland International Labour Office

Kerlinger, F. (1973).*Foundation of behavioral science*. New York: Holt, Rinehart and Winston

Kothari, C. (2004). Methods and Techniques, Research Methodology, Revised Second Edition, New Delhi, India, New age international publishers,

Kenya National Bureau of Statistics (KNBS) and ICF Macro. 2010. *Kenya Demographic and Health Survey 2008-09*. Calverton, Maryland: KNBS and ICF Macro.

Letinen, (2009). The impact of globalization on occupational health services: A case of developing countries, Kampala Uganda

Lehtinen, (eds), (2011). Proceedings of Regional Symposium on Occupational Health and Safety. *African Newsletter on Occupational Health and Safety*, page 27. Helsinki Finland.

- Marsh, P., (2009).**Occupational Health and Safety Management Implementation Guide., employee Health Unit,Melbourne
- Mugenda, O.M. and Mugenda, A. G., (2003).** Research Methods: Quantitative and Qualitative Approaches. ACTS Press. Nairobi, Kenya.
- Michael H. &Merson, (Eds) (2006).** *International Public Health, Diseases Programs, Systems and Policies*, Second edition, Massachusetts, Jones and Bartelet Publishers USA
- NIOSH, (2007).**Ergonomic Guidelines for Manual Material Handling, Department of industrial development, Canada
- UNDP (2013.)** Disaster Management-National perspective, Geneva Switzerland
- Ogula, P. A. (2005).***Research Methods*. CUEA Publications Nairobi Kenya
- Pius, W., (2009).** Vol. 19 no. 2, Planning Occupational Health and Safety Activities African Newsletter on occupational Health and safety,Helsinki, Switzerland. Volume 19, 2009 no. 2,
- Suvi., L.(eds), (2010).** 8th Meeting of Who Collaborating Centers in Occupational Safety and Health. *African Newsletter on Occupational Safety and Health*, Helsinki, Finland.
- Suvi, I., (2009).** New Emerging Risks. *African Newsletter on occupational Health and safety*, Vol. 19, number 3, Finland. Helsinki.
- Tavakolet al2011,**Making sense of Cronbach's alpha, *international journal on medical education*, New International Press New Delhi, India
- Tony Hararia and Bill Curran, (2012).**The Importance of Case studies for LIS Education, University of Ottawa, Canada, and Page 810
- Travis M. (2009).** Health Hazards in Construction Protection, Productivity and Performance, Laborers publishers, Maryland USA

APPENDIX 1
QUESTIONNAIRE

INFORMED CONSENT

I am a masters' student at Institute for Energy and Environment of JKUAT pursuing Master of Science degree in Occupational Safety and Health. I kindly request you to answer the following questions designed to provide information on occupational safety and health management systems at Egerton University. The information that you provide shall remain anonymous and will not be disclosed to anybody else. So feel free and provide the true information

Instructions

1. Please provide the information required as accurately as possible
2. Do not write your name
3. All the information will be handled with utmost confidentiality

A. General information

1. What is your gender? M F
2. What is your age? 18-28yrs 29-39yrs 40-49yrs
50-59yrs 60-69yrs >70yrs
3. What is your marital status? M S Divorced separated
4. Which department do you work? (Please indicate).....
5. How long have you worked at Egerton university? <5yrs 6-10yrs 11-
15yrs 0yrs >2 s

B. Workplace information

1. Have you ever fallen ill at your work place? YES NO
2. If yes do you relate the illness to the work you do? YES NO
3. What measures were taken by the employer?
a) First aid given b) taken to hospital c) no action taken
4. Do you have adequate working tools/equipments that you require? YES NO

5. How would you rate your working environment? FAIR GOOD
EXCELLENT
6. How would you rate the efficiency of your working Machines/Tools/ equipments?
FAIR GOOD EXCELLENT
7. Do you have personal protective equipments? YES NO
8. If yes do you use them? YES NO
9. If your answer is no to above please state the reason.....

C. Medical information

- a) Were you done medical examination on employment? YES NO
- b) How often is medical examination done on you in a year?
NON ONCE TWICE AFTER A SICK OFF
Others.....
.....

D. Safety and Health training

- a) Have you ever gone for any training on health and safety? YES
NO
If yes, please indicate.....
If no please state the reason.....
- b) In which are were you trained?.....

SIGNED

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MR. DAVID K. NJERU

APPENDIX 2

INTERVIEW SCHEDULE

1. Management Commitment and Employee involvement

- b) Is there a safety and health policy in place YES NO
If no please give a reason.....
- c) Is there a health and safety committee? YES NO
If no please state the reason.
- d) What mechanism(s) is/are there to reduce the extent and severity of work related injuries and illnesses?
- e) How does the management Improve employee morale and productivity in order to motivate the worker?
- f) What is the level of the Management commitment?
- g) How does the management allocate resources for organizing and controlling activities within the university to address hazards?
- h) To what extent is Employer involved to provide means through which workers develop and express their own commitment to health and safety protection.....
- i) Are there measures in place for health and safety performance? YES NO
If yes which ones are they?
- If No what is/are the reasons?

2. worksite health and safety policy

- a) Are there Established channels for communication? YES NO
- b) Are there clear goals and objectives for the health and safety program
YES NO
- c) Is there employee involvement in the program and in decisions that affect their health and safety (e.g., inspection or hazard analysis teams; developing or revising safe work rules; training new hires

or co-workers; assisting in accident investigations) YES

NO Do what are the reason/s?

d) Has the university assigned responsibility for communication all aspects of the health and safety program?

YES NO

e) How often is the policy and its operations reviewed to evaluate, identify deficiencies, and revised?

3. **Worksite Analysis**

a) Do you carry out examinations, to identify not only existing hazards, but also conditions and operations where changes might occur to create hazards

YES NO

If no please state the reason.....

b) Do you conduct comprehensive baseline and periodic surveys for health and safety?

YES NO

c) Do you analyze planned and new facilities, processes, materials, and equipment

YES NO

d) Do you provide for regular site health and safety inspection and Perform

routine job hazard analyses YES NO

If no please state the reason.....

e) Provide a reliable system for employees, without fear of reprisal, to notify management about apparent hazardous conditions and to receive timely and

appropriate responses YES NO

f) Provide for investigation of accidents and "near miss" incident; so that their causes and means for prevention are identified YES NO

g) Analyze injury and illness trends over time, so that patterns with common causes can be identifies and prevented YES NO

4. **Hazard prevention and control**

a) What mechanism are there to determination that a hazard or potential hazard exists

YES NO

If no please stat the reason.....

b) What measures are in place to prevent hazards by effective design of job or job site Where elimination is not feasible, control hazard to prevent unsafe and unhealthful exposure.....

c) How long does Elimination or control take to be accomplished?
.....

d) Are there Procedures for safe work which are understood and followed as a result of training, positive reinforcement, correction of unsafe performance, and enforcement

Provision of personal protective equipment YES

If no, please state the reason-----

Do you address the health and safety responsibilities of all personnel, whether salaried or on cont YES NO

e) Is there a system to ensure that supervisors carry out their health and safety responsibilities, including; Analyzing the work under their supervision to; identifying unrecognized potential hazards; Maintaining physical protections in work areas Reinforcing employee training through continual performance feedback and, if needed, Enforcement of safe work practices.....

f) To what extent do you comply with OSHA, 2007?.....

SIGNED.....

MR. DAVID K. NJERU

APPENDIX 3

OBSERVATION CHECKLIST

PRESENT ABSENT

1. **MACHINERY**

- a) Provision of the design criteria
- b) Provide information on the safe operation of the machine
- c) State of Maintenance
- d) Reliability
- e) Guarantee periodPrime movers
- f) Transmission machinery
- g) Other machinery
- h) Construction and maintenance of fencing.....
- i) Hoists and lifts.....
- j) Chains, ropes and lifting tackle.....
- k) Cranes and other lifting machine

2. **HEALTH GENERAL PROVISIONS**

- i. Cleanliness.....
- ii. Overcrowding.
- iii. Ventilation.
- iv. Lighting.
- v. Drainage of floors.
- vi. Supply of drinking water.
- vii. Washing facilities.
- viii. Accommodation for clothing.
- ix. First-aid.
- x. Supervision of apprentices and indentured learners.....
- xi. Meals in certain dangerous trades.....

xii. Personal Protective equipments.....

3. **CHEMICAL SAFETY**

- a) The handling, transportation and disposal of chemicals and other hazardous substances materials.
- b) Material safety data sheets.
- c) Labelling and marking.
- d) Classification of hazardous chemicals and substances.....

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MR. DAVID K, NJERU