ASSESSMENT OF THE OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PRACTICES IN WATER SERVICE INDUSTRY IN KISUMU COUNTY KENYA

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Assessment of the Occupational Safety and Health Management Practices in Water Service Industry in Kisumu County Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

Signature Date …….

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

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DEDICATION

I dedicate this thesis to my parents and family; - My late mother Lucia Abonyo, My father Joram, my wife Moniq, and loving daughters Yvette and Jeanette Ibrahims.

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May God bless you all

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LIST OF ABBREVIATIONS AND ACRONYMS

EHS	Environmental Health and Safety
ILO	International Labour Organization
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KIWASCO	Kisumu Water and Sewerage Company
LVNWSB	Lake Victoria North Water Service Board
LVSWSB	Lake Victoria South Water Service Board
MDG	Millennium Development Goal
OSHA 2007	Occupational Safety and Health Act of 2007
OSH	Occupational Safety and Health
SPA	Service Provision Agreement
SPE	Severity, Probability, Exposure
SPSS	Statistical Package for Social Scientist
PCBs	Poly-Chloro- Benzenes
PPE	Personal Protective Equipment
PSC	Psychosocial Safety Climate
PSI	Public Service International
WAS	Water Sanitation and Hygiene
WHO	World Health Organization

DEFINITION OF TERMS

Assessment: Is the process of finding to ascertain the status of the facility and activities in regards to occupational health and safety.

Ergonomics is an applied science concerned with the design of workplaces, tools, and tasks that match the physiological, anatomical, and psychological characteristics and capabilities of the worker.

Hazard: A potentially damaging physical event, human activity or phenomenon with a potential to cause loss of life or injury, property damage, social and economic disruption of life and environmental degradation among other effects.

Health and Safety: Is the soundness of the environment and physical wellbeing to aid or allow worker to operate as desired.

IAEA: International Energy Agency

INSAG: International Nuclear Safety Advisory Group

Occupational: Is work related.

Practices: Are activities and processes including codes and norms in the workplace

Risks: Is the likelihood of identified hazards causing harm in exposed populations

Sewage: The term is used to mean raw sewage, sewage sludge, or septic tank waste

Water Service Industry: Is the process of developing and operations of water and sanitation systems.

WASREB: Water Services Regulatory Board

WIBA 2007: Work Injury Benefits Act, 2007

Work Environment: The term for this study is used to refer to the facilities, resources and atmosphere or workspace provided by the employer for the employee to deliver daily on the tasks assigned by the organization eg construction site, office or water /waste water treatment facility.

ABSTRACT

For a long time, water infrastructures have remained neglected, the state of facilities has contributed to poor service delivery in the water sector. The objective of this study was to determine the influence of Occupational Safety and Health (OSH) practices on workplace environment in the water service industry. The target population of the study was 80, being the numbers from Kisumu County water service provider (Kisumu Water and Sewerage Company Limited) and Lake Victoria South Water Service Board, working in the construction and operations of water and sanitation facilities. A Census and simple random sampling was employed to draw the respondents from each site and self-administered semi-structured questionnaire was used to acquire data due to specificity and limited number of staff in the target facilities. The data were analyzed using Statistical Package for Social Sciences (SPSS) version 21. Frequencies and percentages were obtained and correlations done using Spearman's rho correlation coefficients for rank correlation (Statistical dependence between the ranking of two variables). The results indicated that 72.4% of staff were aware of existence of Safety and Health Act of 2007.The research found that enhancing awareness among staff on the occupational safety and health improves work environment, r (76) =.0363,p=0.001, CL = 95%.If exposure to hazards and risks are reduced then the work environment would improve r (76) = -0.095,p=0.413. CL=95%. Majority of the respondents at 59(77.6%) stated that the employer enforced health and safety regulations. The research concluded that practicing occupational safety and health increases the chances of conducive working environment. There exists significant relationship between Occupational Safety and Health practices and management, and workplace environment in the water service industry in Kenya. The management of water service industry should give immediate attention to Biological and Chemical risks while other risks are given attention in the near future. The water sector should increase staff sensitization on occupational safety and health. This study suggests further investigations on the impact of the current biological and chemical risks among staff in the water sector industry.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Occupational Safety and Health is multidisciplinary field of safety, health and welfare of people at work, it's purposed to enhance a safe, healthy and motivating work environment. Employers under management practices have a common law duty of reasonable care of the safety and health of employees as may be imposed by constitution and relevant laws. Low compliance to Occupational Safety and Health regulations affects staff work satisfaction. Healthy workplace concept provides a valuable tool for developing or reinforcing occupational health and safety standards so that conditions continually improve for the working population. However, a healthy workplace is not only free of hazards, but provides an environment that is stimulating and satisfying for the workers. Environmental issues associated with water and sanitation projects may principally occur during the construction and operation phases, depending on project specific characteristics and components. Water and sanitation projects are frequently justified on the basis of their contribution to health. The water sector facilities (e.g treatment works, storage tanks, pumping stations and sewers) all involve significant occupational risks for the staff engaged in building and operation. Larcher and Sohail (1999) identified that construction and operation in developing countries is particularly dangerous, and that a cursory inspection of any job site will reveal many health and safety hazards.

1.1.1 Occupational Safety and Health Management Practices

Specific policies and procedures address particular issues or hazards. They are administrative measures to control workplace hazards and should be used together with other hazard control measures to eliminate or reduce the risks of workplace illness or injury. Health and safety policies are part of a framework for effective health and safety management. A general health and safety policy states management intention to provide

a safe and healthy workplace, and also states the health and safety goals of a workplace. It should demonstrate the duties and intentions to voluntarily comply with those duties. An objective of the occupational health and safety Act 2007 is the elimination at the source of risks to the health, safety and welfare of persons at work. The supportive regulations to this Act include the measures to control risk by eliminating toxic substances, hazardous plant or processes which are not necessary to a system of work. Risks can be eliminated so far as practicable by use of one or more methods including substitution, isolation, engineering controls, administrative controls, finally personal protective clothing and equipments.

1.1.2 Water Industry in Kisumu County

The Water Act 2002 separates functions of water resources management and water services and sanitation regulations, operations and management hence improving human rights to water and sanitation. Positive outcomes of the reforms included better organization of the sector, increased investment and attention; improved governance and sector attracting quality professionals. The largest provider of piped water and sewerage services in Kisumu is the Kisumu Water and Sewerage Company (KIWASCO). Gulf Water Company is the other water service provider serving pre-urban and rural parts of Kisumu as water undertaker. There are other small scale community water and sanitation service providers in this area of jurisdiction. There are currently two raw water intake points in Kisumu town; Dunga treatment works from Lake Victoria and gravity system from Kajulu and one waste water treatment facility in town. Both water treatment plants comprise of intake facility from where water is directed to conventional water treatment, coagulant is added to raw water before filtration and finally disinfected for domestic use. The waste water involves collection and conveyance to wastewater treatment plant; where biological methods are used through anaerobic, aerobic or activated sludge before discharging effluent to surface or public waters. The study looked at the water industry workers in both construction and services provision. The respondents were drawn from Lake Victoria South Water Service Board, Kisumu Water

and Sewerage Company and Gulf Water Company as service providers and asset developers within the area of study.

The 2009 Population and Housing Census report by the Kenya National Bureau of Statistics (2010) indicate that Kisumu County is one of the devolved counties of Kenya with a population of 968,909 inhabitants occupying a land area totaling 2,085.9 km^2. The county hosts the following constituencies; Kisumu Central, Kisumu Town East, Kisumu Town West, Muhoroni, Nyakach, Nyando and Seme.

The former City Council of Kisumu owned all water and sewerage facilities in the city. However, since the enactment of the Kenya Water Act 2002, which separated the functions of policy formulation and regulation from service provision, the task of efficient and economical provision of water and sewerage services have since been devolved to Water Service Boards, the agency responsible for executing and implementing water projects as well as licensing water service providers in Kisumu.

Kisumu County Government is committed to supporting water, sanitation and hygiene service provision. Previous efforts by the stakeholders, just to mention a few, Municipal Council of Kisumu, Kisumu Water and Sewerage Company, Lake Victoria South Water Services Board, Water Resources Management Authority, Nyanza Provincial Public Health and Sanitation Department, services range from policy formulation and regulation, licensing of water services provision and, water and sewerage service provision. There are few challenges with the reforms that included lack of capacity in governance, human rights, commercial orientation and regulations; inadequate communication and information management systems regulations, monitoring and evaluation as well as poor complaints and feedback mechanisms (Ombogo, n.d).

WASREB Report (2015) cites the Annual Water Sector Review 2013/14 estimating investments in urban water and sanitation at Kshs 12 billion in the year 2013/14 compared to the need that stood at around Kshs. 75 billion. The report indicated stagnation in water utility performance of coverage despite increased hours of supply.

In the year 2013/14 utilities were ranked on the basis of nine Key Performance Indicators (KPIs) that is water coverage, Drinking Water Quality, Hours of Supply, Non Revenue Water (NRW), Metering Ratio, Staff productivity, Revenue collection efficiency, Operations and Maintenance (O&M) Cost coverage and Personnel Expenditure as % of O&M Costs. WASREB reported that good performance is an indication of efforts to realize human rights to water and sanitation (Impact Report 2015). In the reporting year 2013/14, the report showed that drinking water quality dropped from 92% to 91% while service hours increased to 18%. NRW improved from 43% to 42% but still bellow acceptable level of less than 25%. This translates to loss of Kshs 10.6 billion, posing great threat to sectors financial sustainability and obstructs Kenya's aspiration to higher living standards.

Water Service Regulatory Board (WASREB) ensures adherence to the requirements of Water Act 2002. According to the Impact report 2015, staff productivity is the measure of the efficiency of utilities in utilizing their staff. In overall, it is 7 staff per 1000 connections.

1.2 Statement of the problem

Access to safe affordable water is one of the main challenges facing the people of Kisumu County. Keeping the pace with fast growing demand of population growth in the town is more of continuous challenge. This has increased inadequacy, unreliability and poor water quality. According to Kisumu County Water Conference (2013) workshop, out of the 13 number water utilities in Kisumu County, only 3 provide clean portable water… The conference confirmed that the current regulatory environment could not balance financial and political objectives in legislations and administrative direction. Service provision improvement efforts are required to provide potable, quality water at an affordable price in reducing deaths caused by waterborne diseases in town.

WASREB (2015) states that, in Kenya, water service coverage level in urban areas currently stands at 53%. In the last 10 years of water sector reforms great transformation

had been witnessed especially in the formalization and commercialization of water services…The highest investment levels in 2013/14 were recorded in Lake Victoria North Water Service Board (LVNWSB) and Lake Victoria South Water Service Board (LVSWSB) in Kisumu County.

Kisumu County, with the revelation that less than one quarter of the existing infrastructures provides clean portable water, justifies the need to establish if occupational safety and health practices does relate with work environment and how it influences staff performance in service delivery in Kisumu County. This study therefore, sought to assess the practices of occupational health and safety on work environment in the water service industry.

Kisumu County inadequate water service provision has called for increased investment from the government. However, whether the strategy will solve the current problem is yet to be confirmed. There are no existing literatures on the state of Occupational Safety and Health in the water sector in Kenya especially Kisumu County. Like other sectors, Kisumu County could be victim of low compliance to health and safety regulations where the level of regulation and enforcement of occupational health and safety is grossly inadequate; especially when compared to developed countries (Rotich & Kwasira, 2015).

According to Manduku and Munjiri (2017) a closer scrutiny of the Occupational Safety and Health Act 2007 (OSHA) reveals that many of the dangerous occurrences and prescribed occupational diseases in the 1st and 2nd schedules may exist. Assets development and operations of water and sanitation facilities are risky assignments for contractors and operators. Practices like training and risk elimination or reduction in the workplaces introduces motivational factors that enhance ownership and productivity.

In the wake of upcoming technology, social conflicts and terrorism; water infrastructure facilities remain vulnerable and easy points of access to implement acts of terror. Water sector staff's satisfaction in the workplace is key to safety of the millions of population

benefiting within water services provision including those who use the raw water from the open surface sources. Actual and potential losses due to occupational health and safety cause enormous problems in the workplace globally. This study is therefore significant in the following ways:-

Foremost, by addressing the health and safety of the employee, it is hoped that it's findings will alleviate or prevent suffering to the targeted cadre of the water sector personnel.

Secondly, since the sector incurs heavy expenses and loss of manpower as a result of health and safety, the study will help in reducing costs due to hospitalization, insurance claims and rehabilitation of water facilities.

The results of the study will provide the policy maker with evidence to improve strategies of integrating proper OSH policies in the practices and management of water and sanitation assets' development and operations.

Finally, the study will add to existing knowledge about the impact of occupational health and safety on employee, and will serve as a reference material for further research. No study on OSH practices in water sector has been carried out in Kenya.

1.3 Objectives

The main objective was to assess the Occupational Safety and Health practices on employee satisfaction of workplace environment in the water service industry in Kisumu County.

1.3.1 Specific objectives

i. To establish the current level of knowledge on occupational safety and health among staff in water service industry in Kisumu County.

ii. To determine effects of occupational safety and health hazard's exposure, on work environment in water service industry in Kisumu County.

iii. To assess the impact of occupational safety and health awareness and training on employee satisfaction in work environment in water service industry in Kisumu County.

iv. To establish relationship between occupational safety and health- Awareness, training and hazard's exposure, and employee satisfaction in work environment in the water service industry in Kisumu County.

1.4 Research Questions

What is the current level of knowledge of Occupational Safety and Health in the water service industry in Kisumu County?

What are the effects of Occupational Safety and Health hazards' exposure on work environment in the water service industry in Kisumu County?

What are the impacts of Occupational Safety and Health awareness and training on employees' satisfaction in work environment in the water service industry in Kisumu County?

Is there any relationship between occupational safety and health- Awareness, training and hazard's exposure, and employee satisfaction in work environment in the water service industry in Kisumu County?

1.5 Scope of the Study

The study focused on the operations of Kisumu Water and Sewerage Company (KIWASCO), Gulf in Kisumu County in water and waste water treatment and Lake Victoria South Water Service Board (LVSWSB) staff and agents where infrastructure developments are ongoing within its area of jurisdiction before handing over for operations within the Board's area of jurisdiction.

1.6 Study Limitations

This study focused more on the operations and development with staff forming majority of the respondents. The study experienced limitation of time and financial resources due to the extent of travels to cover project areas that included areas of jurisdiction of LVSWSB. Psychosocial assessments like trauma and other Psychological risk were purely based on perception and observation. The research engaged three teams that enabled data collection to be done on time using available resources without compromising on the quality of data collection and final report.

CHAPTER TWO

LITERATURE REVIEW

2.1 Background information

The ILO/WHO joint Advisory Committee on Occupational Health during the 13th Session in December, 2003 identified as priorities; Guidance and support for national OSH programmes, Enhancing regional collaboration and coordination, Coordination and enhancement of information and education programmes and materials, and Awareness raising activities and instruments.

Nzuve *et al*. (2012) explained that Occupational Safety and Health (OSH) has become a global concern for employers, workers and national governments. Despite global efforts to address OSH concerns, it is estimated that 2 million work related fatalities still occur every year. In addition, there are more than 330 million occupational accidents and 160 million work related diseases that affect workers every year (as cited in Nzuve *et al.,* 2012).It is estimated that more than $ 1.25 trillion, which is equivalent to 4% of the world's Gross Domestic Product (GDP) is lost each year due to occupational accidents and diseases (Nzuve *et al.,* 2012).

In assessment of success factors in the implementation of health and safety programs by Rotich and Kwasira, (2015) in Tea factory in Kenya; the right to safe and healthy working conditions is part of the broader right of everyone to the enjoyment of just and favorable conditions of work, enshrined inter alia in article 23 of the Universal Declaration of Human Rights and article 7 of the International Covenant on Economic, Social and Cultural Rights.

According to Oxenburgh *et al.* 2010 health and safety of all employees is closely linked to the company's productivity in all workplaces; perception that cases of Occupational Safety and Health (OSH) is largely measured by negative outcomes such as workplace injuries and illness is short of the truth as low incidences of injuries do not necessarily

mean adequate safety systems and controls in place.

Thobora and Thuita (2015) indicated that Statistics from Ghana, Kenya, South Africa and Zimbabwe show a large proportion of all deaths and morbidities result from accident injuries… In rural District in Kenya, 17% of all deaths among persons of ages 15-64 years in the 1980s were attributed to injuries. The right to safe and healthy working conditions has dramatically gained a lot of interest at the global, regional and national levels (Nzuve & Ayubu, 2012). From the perspective of secondary effect OSH can protect co-workers, family members, employers, customers, supporters, nearby communities and other members of public affected by workplace environment.

Achievement of the highest standard of safety and health at workplace is critical to eliminate or at least minimize safety and health hazards and risks (as cited in Nzuve *et al.,* 2012). Nyakang'o (2016); states that the status of occupational health and safety conditions in Kenya is an issue of growing importance to the industrialists, practitioners, the government and consumers. This author cites that despite subsidiary legislation (legal Notice No.31 of 2004) that provided for formation of joint committees in the work places on all issues of safety and audits, it is almost impossible to characterize the conditions under which employees work due to the scarcity of data.

Katsuro *et al.* (2010) study found that bad occupational health and safety practices in food factories decrease the workers performance, leading to decline in productivity. Njuguna (2007) confirms that providing a safe environment and minimizing potential risk are both the moral and legal responsibility of the organizations and that a safety culture should be maintained when they are attentive to safety issues. He recommended that a positive safety culture can be developed through the allocation of praise, promotions and cash to employees who behave safely. This implied that when workers are well motivated they behave safely at workplace, this minimizes the human error that may cause or create unsafe working environment.

2.2 Theoretical Review

2.2.1 Theoretical principles

The study was guided by theories relevant to understanding the relationship between occupational health and safety practices and management, and working environment in water service industry.

2.1.1.1 Maslow Theory

The theory ranks needs from Self Actualization, Esteem, Social Safety and finally physiological needs at the bottom of hierarchy. The Maslow's theory of motivation is that human beings are motivated by unsatisfied needs and that certain lower needs need to be satisfied before higher needs. This law believes that all people are motivated to move up the hierarchy towards a level of self actualization. This theory of hierarchy of needs by Abraham Maslow on Safety ranks as an important factor in job satisfaction (Kreitner, 2007; Thobora & Thuita, 2015). Abraham Maslow ranks safety as an important factor in job satisfaction.

2.1.1.2 Social Cognitive Theory

This comes in to explain that what people think, believe and feel affect how they behave, In social cognitive theory, people are neither driven by inner forces nor automatically shaped and controlled by the environment. People function as contributors to their own motivation, behavior, and development within a network of reciprocally interacting influences. Persons are characterized within this theoretical perspective in terms of a number of basic capabilities (Bandura, 1989) It asserts that behavior depends on social environment and its dynamics or changes. These are new practices in the workplace to improved safety. There is interaction between the behavior, personality and the environment hence this is called reciprocal determinisms in the Social Cognitive Theory (SCT). Environment is objective notion of all factors that can affect human

behavior eg. lighting dust, color etc. Cognitive is a situation of environment, and could be real, imagined or distorted.

2.1.1.3 Psychosocial Safety Climate (PSC).

This theory explains how individuals ascribe meaning to their work environment**.** This theory explains how individuals ascribe meaning to their work environment. According to Radzaz, and Bahari (2013) Psychosocial safety climate (PSC) is a new aspect to be considered in organization in order to overcome work stress issues among employees. The operation of PSC is believed to be influenced by senior management because they were authorized to control the policies in organization. Is salient for the manager to favor safety issues and shows the apprehension upon safety towards employees by conceive the policies, practice and procedure that prevent psychological health and safety among employees. Policies, practices and procedures were design according to the priority in organization Management commitment is believed to be the vital underlying mechanism in expecting employees' psychology health and safety outcome. Psychosocial safety means that an employee able to feel free expressing his/her self without feeling anxious on his/her own fear and negative consequences on his/herself (Radzaz et *al.,*2013)

2.2.2 Relevance of theories to OSH

From the perception of water sector, the purpose of staff deployment by managements to the formerly dilapidated infrastructures without addressing their work environment could just confirm the punitive intentions. This fact could support low staff morale in the facilities. Good OSH practices motivate psychosocial ego which in turn enhance work environment and influence productivity through employee satisfaction. The practices of the mentioned theories introduce culture that does not require regulatory interventions.

According to Rotich and Kwasira (2015) Psychosocial Safety Climate (PSC) shares perceptions of organizational policies, practices and procedures for the protection of employee psychological health and safety emanating largely from management

practices. James *et al*. (2008) explains the PSC contrast stems from the idea that individuals ascribe meaning to their work environment that is their working conditions, management systems, pay, co-worker relationships, and treatment equity. Social Cognitive Theory by Bandura and Walters (1989) recognizes the fact that many theories have been proposed over the years to explain the developmental changes that people undergo over the courses of their lives. These theories differ in the conceptions of human nature they adopt and in what they regard as basic causes and mechanisms of human motivation and behavior. Different causes influence human behavior at different strengths, some stronger than others. Expectations, beliefs, self-perceptions, goals and intentions give shape and direction to behavior. What people think, believe and feel, affect how they behave as cited in Bandura *et al.* (1989). The report states that natural and extrinsic effects of their actions in turn partly determine their thought, patterns and emotional reactions. People tend to select activities and associates from the vast range of possibilities in turns of their acquired preferences and competencies, The report reveals that aggressive persons produce hostile environment wherever they go, whereas, those who act in a more friendly manner generate an amicable social milieu… it further explains that human behavior is extensively regulated by its effects; Behavior patterns that produce positive outcomes are readily adopted and used, while those that are unrewarding or punishing are generally discarded.

Safety culture is the output of management practices. Human motivation is psychological and shares from perceptions of organizational policies, practices and procedures. Occupational Safety and health Act of 2007 is about culture of safety in the workplace as soft organizational aspect for accident and risk prevention and continually improve the conditions for the working population by stimulation and providing some levels of satisfaction. Research by Ward *et al*. (2008) indicated that an individual employee level, more perceptions and organizational attitudes were associated with better health and wellbeing. Their findings strengthened evidence base for the linkage between good OSH management and improved organizational performance and health at work place.

2.3 Conceptual Framework

The figure 1.1 below illustrates conceptual framework. The independent variable is OSH Practices and Management, whereas the dependant variable is Workplace environment (Health and Safety). The presumed relationship is intervened by OSH Act 2007. The intervening variable is caused by Management practices like training and awareness, and determines the work environment.

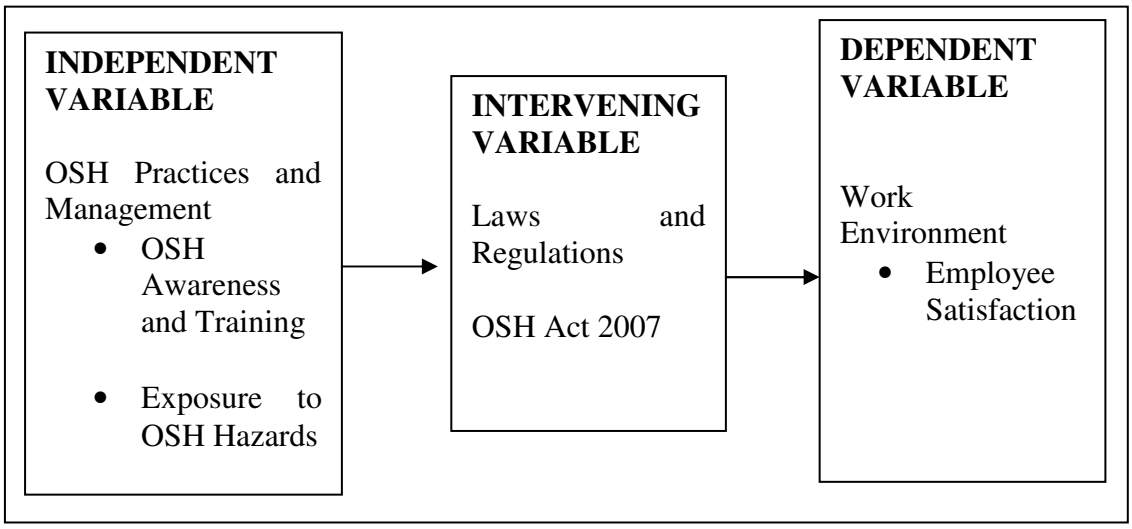

Figure 2.1: Conceptual Framework

2.4 Existing literatures

2.4.1 Staff Knowledge on Occupational Safety and Health

Education and Learning September 2008 report on Literacy's impact on Workplaces

Health and Safety by the Conference of Canada showed that low literacy skills can threaten health and Safety in the workplace, "What you don't Know Can Hurt you". A low level of literacy can jeopardize workers safety if they cannot understand the health and safety regulations provided to them. The report states that there is an open inverse

relationship between investment in literacy skills and industries requiring high level of health and safety. It explains that many employers are not aware of the impacts of literacy skills on workplace health and safety or productivity.

Education for empowerment can be summarized as an approach to learning that is participatory, is based on real-life experiences, incorporates dialogue between and among educators and workers, critically analyses the organizational and system-wide causes for problems, and has the goals of worker action and empowerment. Education is most effective when it includes the context of behaviors, including an analysis of obstacles to safe work practices. Regulations of training do not include workers' right to act. Empowerment education may differ from other training programs which focus on training workers to follow safe behaviors. Wallerstein *et al*. (1992) explained that behavioral approach is based on faulty assumptions that people learn better through discrete chunks of knowledge in a linear sequence unlike cognitive emphasis on problem solving, critical thinking capability and one's belief that one can utilize the knowledge learned; and the second assumption that improved behaviors always lead to a safer and healthier workplace. Thobora *et al.* (2015) explained that employers should ensure employees are protected from hazards at work by ensuring that employees are adequately instructed and trained in safe systems of work such as safe methods for carrying out tasks, safe use of equipments or substances, use of health and safety control measures and personal protective equipments, accident reporting and emergency procedures and their responsibilities for health and safety. Employers are expected to carry out training needs analysis and then provide to employees in appropriate languages: the information, instruction, training and supervision necessary for them to work safely. In identifying training and literacy of the employees, the plant and substances used, hazards identified and risk assessment conducted.

2.4.2 OSH Hazards and Risks

According to Ng'ang'a *et al.(* 2013) there are aspects of work environment that have the potential of causing immediate and sometimes violent harm to a worker. These include poorly maintained equipments, unsafe machineries, and exposure to hazardous chemicals among others. Potential injuries include loss of hearing, eye sight or body like cuts, burns, bruises, broken bones and electric shock. Occupational health and safety impacts during the construction operation and decommissioning of water and sanitation

facilities are common. Occupational safety and health impacts associated with the operational phase of water and sanitation projects include:- Accidents and injuries, Chemicals exposures, Hazardous atmosphere, Exposure to pathogens and vectors, and Noise.

Work at water and sanitation facilities is often physically demanding and may involve hazards such as open water, trenches, and slippery walkways, working at heights, energized circuits and heavy equipments. Work at water and sanitation facilities may also involve entry into confined spaces like manholes, sewers, pipelines, storage tanks, wet walls, digesters, and pump stations. Methane generated from anaerobic biodegradation of sewage can lead to fire and explosions. Water and waste water involve the use of potentially hazardous chemicals including strong acids and bases, chlorine, sodium and calcium hypochlorite and ammonia. Water may contain radioactive substances and heavy metals, which typically accumulate in the water treatment sludge. Potential sources of exposure to radionuclide include pumps and piping where mineral scales accumulate, lagoons and flocculation and sedimentation tanks where residual sludge accumulate; filters, pumping stations and storage where sludge accumulates. Waste water may contain potentially hazardous chemicals depending on the source of water, drinking water treatment processes and industries discharging to the sewer, including chlorinated organic solvents and pesticides, PCB's, polycyclic aromatics, petroleum hydrocarbons, flame retardants, nitrosamines, heavy metals, asbestos, dioxins and radioactive materials.

In addition workers may be exposed to hydrogen sulfide, methane, carbon monoxide chloroform and other chemicals generated during waste water treatment. Oxygen may be displaced or consumed by microorganisms, thus resulting in areas where wastewater or wastewater residues are processed.

Workers and staff at wastewater and sludge treatment facilities and fields where treated wastewater or sludge is applied as well as operators of sludge collections can be exposed to many pathogens contained in sewage. Processing of sewage can generate bio-aerosols which are suspensions of particles in the air consisting partially or wholly of microorganisms, such as bacteria, viruses, molds and fungi. These microorganisms can remain suspended in the air for long periods of time, retaining viability or infectivity. Workers may be exposed to endotoxins, which are produced within a microorganisms released upon destruction of the cell and which can be carried by airborne dust particles. Vectors for sewage pathogen include insects e.g. flies, rodents, rats and birds.

According to Brown (1997), Workers may be exposed to pathogens by inhalation, direct contact, ingestion or through skin cuts or punctures. Infection with an enteric organism can be confirmed by the worker's medical history or by showing that more of the disease organism is shed in the feces than was originally received by the worker, or infection can be inferred if the worker begins to produce antibodies against the disease. He further explains that for AIDS to be transmitted via sewerage would involve blood in the urine or feces of the infected individuals to be discharged in the sewer. Infection would have to involve contact of this material with cuts or broken skin.

Construction industry's appalling health and safety record is a worldwide problem affecting both the developed and developing countries. Very little statistics exist on the nature of accidents and injuries affecting workers in developing countries primarily due to the poor or nonexistence of regulatory framework. However, health and safety data collected in developed countries show a consistent pattern for worker fatalities and injuries. As the nature of construction works is similar in both developed and developing countries, the problems reported in the industrialized world do not appear particularly

"high tech". As the data from developing countries are so scarce it would appear reasonable to assume that the types of fatalities and injuries are similar worldwide. According to Larcher and Sohail (1999), the types and frequencies of injuries that occur to construction workers will vary according to the tasks that they carry out. Some include –Falls, Overexertion or strenuous movement, Handling falling or flying objects, Contacts with stationery objects (Missed steps),Contact with moving objects, Contact with heat or cold, Contact with chemicals, Exposure to electricity, and Fire, explosions or blasts.

From ILO (2002); the International Standards on Safety and Health are set by the international Organization. These standards are based on International Conventions and recommendations on occupational Safety and Health. The most important and wide ranging convention is the 155 convention of 1981 concerning occupational Safety and Health and working environment which applies to all workers in all areas of economic activities.

The convention articulates the principles for a national policy on occupational safety and health and sets out actions to be taken by the state, employer and trade unions. The policy must be given effect through the development and enforcements of laws, then there must be adequate and appropriate systems of inspection, and the enforcement system to provide adequate penalties for the violations of the laws (Ng'ang'a *et al*., 2013). There are potential injuries during the construction and operation of water and sanitation facilities. Physical, biological social, psychological, ergonomical and biological aspects do affect work environment and staff health. However, these risks and hazards are of varying degrees and acceptability. The OSHA 2007 tasks the employer with responsibility of managing and containing the levels of risks and staff exposure as well as the costs arising from injuries of people within the work environment. The staff safety is paramount to enhance productivity.

2.5 Work Environment

According to European Agency for Safety and Health at work (2007); OSH culture can be described in terms of the informal, cultural aspects of an organization. The latter can have an impact on how OSH is perceived and dealt with, and on whether people are aware of OSH-related issues and act in a safe and healthy way.

The term 'safety culture' appears to have been first used after the Chernobyl disaster in 1986. (Taken from Wikipedia, http://en.wikipedia.org/wiki/Chernobyl_disaster. Satisfying work in a safe and pleasant environment is a source of health and well-being; yet the physical, psychological and organizational work environment is all too often responsible for injury and disease. The health of adults of working age affects economic and social development. Recent occupational health data indicate that 40%-50%, of the world population is exposed to hazardous conditions in the workplace. It is estimated that approximately 120 million occupational accidents occur worldwide each year, with 200,000 fatalities. Each year between 68 million and 157 million new cases of occupational diseases arise as a consequence of various types of work-related exposures.

In addition, approximately 30% -50% of workers in industrialized countries experience psychological stress. Environmental stressors such as hazardous conditions are one cause, but occupational stress results from work organization (e.g. workload, lack of autonomy and control over work, shift work, wage scales and routine, repetitive work). Stress associated with work organization has been shown to contribute to cardiovascular disease, muscular skeletal problems and other conditions. Other than the transfer of unsafe technologies, the changing nature of work will have a dramatic impact on worker's health. Technological innovations will result in job losses, replacement of full time work and part-time work, more work in the informal sector and self-employment.

Unfortunately, only 5%-10% of workers in developing countries and 20%-50% of workers in industrialized countries have access to adequate occupational health services. In many countries there are neither the resources nor the control of occupational

hazards. Healthy workers are more likely to be productive workers, who are essential for successful business and lay the foundation for a prosperous economy and sustainable development.

The healthy workplace concept provides a valuable tool for developing or reinforcing occupational health and health standards so that conditions continuously improve for the working population. However, a healthy workplace is not only free of hazards, but also provides an environment that is stimulating and satisfying for those who work there. The healthy organization acknowledges all the elements of occupational health and safety in developing policies and programs for the wellbeing of its workers (WHO, 1999).

The relationships that exist here may be difficult to ascertain because it could be influenced by single or various combinations of variables. Depending on the approach and combinations, the result might be quite different.

2.6 The legal frameworks

2.6.1 The Occupational Health and Safety Act 2007

The history of OSH in Kenya dates back to 1950, when it was found necessary to have a legal instrument to manage the safety, health and welfare of people employed in factories (ILO, 2013). The then colonial government adopted the British Factories Act of 1937. In 1990 the Factories Act was amended to the Factories and Other Places of Work Act, in order to enlarge its scope of coverage. In 2007 this Act was repealed, and was replaced by the Occupational Safety and Health Act (OSHA, 2007). In the same year, the Work Injury Benefits Act was enacted. These laws are administered by the Directorate of Occupational Safety and Health Services (DOSHS). Other legislation that touches on OSH includes the Public Health Act CAP 242, the Environmental Management and Coordination Act (1999), the Radiation Protection Act CAP 243, and the Pest Control Products Act Cap 346. These laws are enforced by different ministries and departments of the Government.

The ILO, 2013 cited the Kenya Economic Survey of 2010 and indicated that the total number of employed persons in Kenya in all sectors in the year 2010 was 10,960,000. The report showed that the number of workplaces in both the formal and informal economies was 140,000, and most of which were micro or small sized enterprises with a low awareness of OSH, and thus were exposing a huge number of workers to workplace risks.

The occupational Safety and Health Act 2007 aims at securing the safety, health and welfare of workers and the protection of persons other than the workers against the risk to safety and health arising out of, or in connection with the activities of persons at work. The Act sets objectives to promote and improve occupational safety and health standards.

The OSH services in Kenya are governed by two pieces of legislation: the Occupational Safety and Health Act, 2007 (OSHA, 2007) and the Work Injury Benefits Act, 2007 (WIBA, 2007). The purpose of OSHA 2007, is to secure the safety, health and welfare of people at work, and to protect those not at work from risks to their safety and health arising from, or in connection with, the activities of people at work. The purpose of WIBA 2007 is to provide compensation to employees for work-related injuries and diseases contracted in the course of their employment, and for connected purposes.

Nyakang'o, (2016) confirm that more than half of the industrial accidents and injuries in Kenya go unreported. The report estimates that occupational health and safety fatalities and injuries in Kenya for the last five years 2000-2004 are: 1528, 1923, 1332, 1599 and 1387, this was viewed from the background that 11,387 factories and other places of work are registered by the Department of Health and Safety. The report observed that in 2003, mining, construction and transport accounted for 41% of accidents in Kenya, machine operators and assemblers 28% while other occupations share 31% of workplace accidents. From this detail, in relation to age groups 44.4% of the injuries occurred to persons in the age group of 20 to 29 years, 25% to the age group of 30 to 39 years and 24% to the age below 20 years.

2.6.2 Legal Notice Number 31 of 2004

The Kenya subsidiary Legislation, 2004 as per the Factories other places of work Act (Cap 514) cited as Factories and Other Places of Work Rules, 2004 applies to all factories and other places of work with twenty or more employees.

It requires formation of a Safety and Health Committee consisting of; 3 number representatives from management and workers in workplaces with workers between 20 and 100. Where the number of workers is between 100 to 1000 the committee should have 5 representatives and for workforce of more than 1000, there should be 7 representatives.

The committee functions include- establishment of schedules of inspection, quarterly safety and health inspection, inspection-investigation and recommendation on accidents and dangerous occurrences; Identification of occupational hazards, compilation of statistics of accidents, dangerous occurrences and cases of ill health. The committee is to compile workers' complaints advice on safety and health, establish effective communication and organize activities for the fulfillment of committees mandate in the workplace.

2.7 Previous works relevant to study

The investigation report by the International Nuclear Safety Advisory Group (INSAG) of the International Atomic Energy Agency (IAEA) pinpointed "poor safety culture" as one of the contributing factors to this worst nuclear power plant accident in history. Investigations of other major, tragic accidents in the following years included the King's Cross underground fire in London (1987) and the explosion of the North Sea oil production (Antonsen, 2009).

From then on the concept of safety culture has been used more and more in safety research, particularly in high-risk industries such as the nuclear and petrochemical industry, and (public) mass transportation (railway, aviation), recognizing the

importance of the human element and soft organizational aspects in accident and risk prevention.

Comparative Risk Assessment, Iavicoli *et al*. (2005) confirms the substantial contribution of selected occupational risk factors to global illness… It is concluded that occupational risk factors are responsible for 37% of back pain, 16% of hearing loss, 10% of injuries, 13% of chronic obstructive pulmonary disease, 11% of asthma, and 9% of lung cancer globally The study also showed absence of data in most of the developing world limited the range of occupational risk factors that could be measured by the WHO, and the available data excluded children under 15 years who work. This report indicated that the WHO comparative risk assessment excluded important occupational risks for reproductive disorders, dermatitis, infectious disease, coronary heart disease, intentional injuries, musculo-skeletal disorders of the upper extremities, and most cancers. Psychosocial risk factors such as workplace stress could not be studied, nor could pesticide, heavy metal, or solvent exposures. (Iavicoli *et al.,* 2005).

2.7.1 Critique of the Existing Literature relevant to the study

According to Article 42 and 70 Constitution of Kenya, every citizen is guaranteed the right to a clean and healthy environment (Kenya Constitution, 2010). This incorporates the principles of intra-generational and intergenerational equity with regards to the protection of the environment (Kenya Law Report, 2010). This implies that the working environment also needs to be clean and healthy to the workers. Public Services International (2011) observes that a working environment that is rewarding when workers are valued, that is safe and stress free, and that provides satisfying work and opportunities for career development avoids putting workers in a position to migrate.

According to Wallerstein and Weinger (1992); three major problems need to be addressed before the field of worker health and safety education can advance. The lack of clarity and consensus on the goals of worker education, lack of standards for effective teaching methods, including the lack of skills in these methods of the people who deliver

the trainings, and inadequacy of program evaluation.

Thobora and Thuita, (2015) in assessing the levels of compliance on occupational safety and health risk management practices with occupational safety legislation in public institutions, confirms that OSH systems should reduce high level exposures to hazards to ensure safe work environment. This is correct as good systems are just but part of the success in implementation.

Though Rotich and Kwasira, (2015) established a positive, strong and statistically significant relationship between employee training on OHS programs and effective implementation of OHS programs, in assessing success factors in the implementation of occupational health and safety programs in tea firms in Kenya this may not be entirely true as work environment in Kaisugu Tea Factory must have had positive contribution in confirming the significance. In my opinion since Psychosocial Climate (PSC) is key in effective implementation of OHS programs, the psychosocial aspects of OSH practices and management have greater influence on work environment as indicated by employee satisfaction.

2.8 Research gaps

While specific sector studies on compliance with OSH by Rotich *et al.* (2015) recommends examination of the role of the government in implementation of OSH programs in the public sector, there are inadequate systems and structures by the government for compliance. There is inadequate sector specific research in different parts of the country on the extent of compliance. No research has been carried out for the water sector in Kenya.

The Kenyan government has not developed adequate mechanisms for hazards identification that are sector specific to help workers map out and isolate the hazards. Despite selective implementation of workplace safety and health regulations, sustenance of good practices like follow-ups on employee counseling, rehabilitation or reward for high level safety performance level is not known to the employers.

The outcome of this research would add on knowledge and help improve on the formulation of government policy on OSH systems. Information on Occupational Health and Safety risks confronting young workers' on relationship or connection between production systems, precarious employment and Occupational Health and Safety in the service industries need more investigation to help in the formulation of risk reduction strategies.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Design

The study utilized a descriptive survey research design. Descriptive research technique was used as an action strategy to study the current situation in defining the OSH in the water industry. The study investigated the aforementioned variables influence on workers environment in the water service. This study resulted in large descriptive and cross sectional studies. Case study research design was chosen because it focused on typical cases experiencing OSH related problems in the sector. Such issues are adequately investigated through qualitative methods since it generally answers questions with precise information concerning subject of study.

This design has been advised by researcher's need to analyze opinions of the respondents regarding the study variables. Descriptive research generally precedes explanatory research; hence this is the best strategy for acquiring information with high accuracy and better understanding of the key topic under study and the group characteristics in this given situation. The cross sectional approach was able to observe and analyze representatives of the study population at a specific point in time.

3.2 Study area and population

The target Population of 80 workers is drawn from a total of 410 workers, being 60 workers in LVSWSB, 300 in KIWASCO and 50 in Gulf.

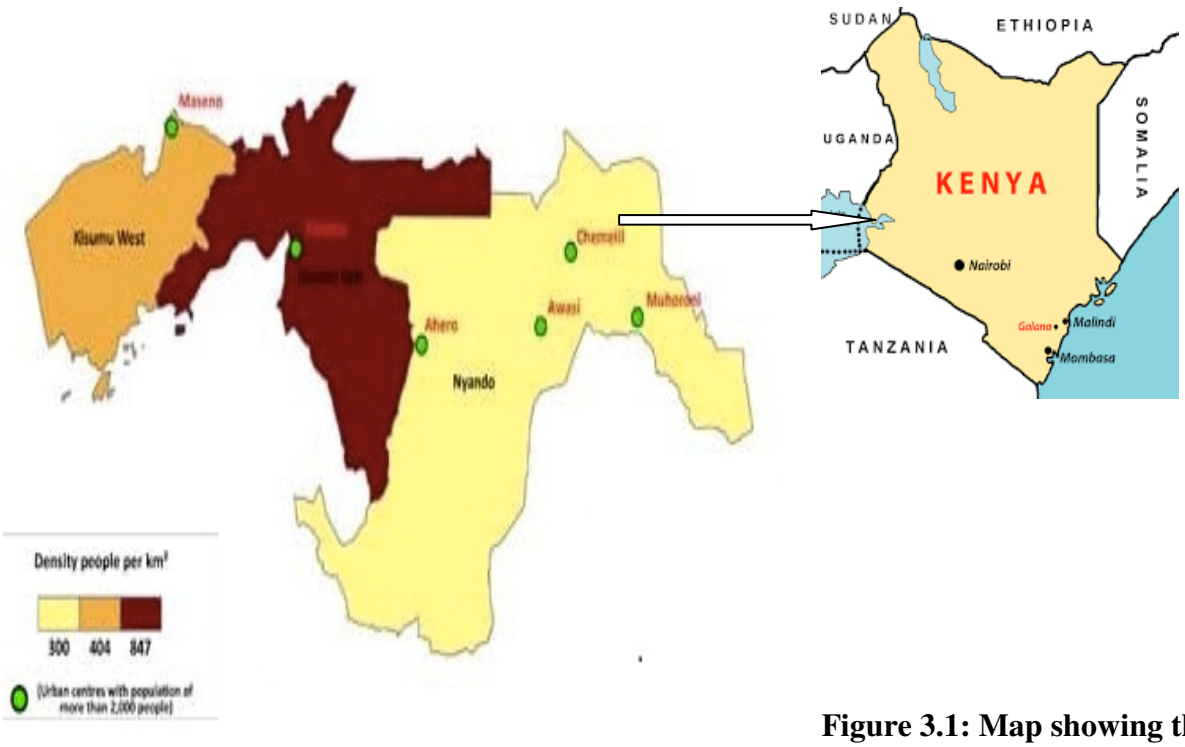

Figure 3.1: Map showing the study location in Kenya

3.3 Sampling method

The census sampling techniques were applied for the purpose of selecting the sample size of the study. This was because research target population was small particularly found in specific functions like water treatment, waste water treatment and constructions. For the outlets the County was sub-divided into groups namely LVNWSB, KIWASCO, GULF, DUNGA and KAJULU. The groups were further identified as either asset development or asset operation staff. The method of proportional allocation was used; under which the size of the sample was kept proportional to the size of the strata based on ratios as follows:

$$\text{KIWASCO} = \frac{300 \times 80}{410} = 59$$

$$\text{LVSWSB} = \frac{60 \times 80}{410} = 12$$

Gulf = $\frac{50 \times 80}{410} = 10$

A self-administered semi-structured questionnaire was used in this study to acquire data in order to address the stated objectives. The questionnaire allowed for both qualitative and quantitative and was structured in a way that it allowed collection of Bio data and that which address both independent and dependent variables. Furthermore Likert scale was used with relevant range to allow collection of firsthand data and also upholds anonymity in ethical issues important for research studies.

Convenience sampling was used in the water service provider in Kisumu County and the construction site for LVSWSB area of jurisdiction to draw sample from population that was close at hand. The sites were clustered as construction sites, drinking water and waste water treatment plants. The study included development and operation workers who were involved in assets development in their daily activities and those who were managing facility operations in both water and waste water treatment facilities. A simple random sampling was then used to select workers. The variables were then analyzed in one way, two way and more using Analysis of Variance (ANOVA) for distribution. Different variables were compared for relationships.

3.4 Sample size determination

The standard Fisher method (1983) was used to determine the sample size. The method is presented by equation (3.1) in which *n* is the desired sample size when the population is less than 10,000. *z* is the standard normal deviate at a confidence level of 95% or 1.96; *p* is the proportion in the population estimated to have the desired characteristics (estimated at 0.50). *q* is 1.0- *p* and *d* is the degree of accuracy desired (set at 0.05). *d* is the significance level = 0.5

$$n = \frac{Z^2 pq}{d^2} \quad \text{.....Equation 3.1}$$

$$n_f = \frac{n}{1+\frac{n}{N}}$$ ..... Equation 3.2

The method used as presented in equation 3.2 where *n* is the desired Since population is 410, it is less than 10,000 hence equation 3.2 was applied to get 79, approximately 80 target samples. 59, 12 and 10 respondents were drawn from KIWASCO, LVSWSB and Gulf respectively from the target population using simple random method to ensure that each member of the target population had an equal chance of being selected to participate in the study and hence minimize sample error. n_f was computed using equation 3.2 Fisher (1993) where N the target population size is 410.

3.5 Research Instruments and data collection

The researcher had three groups with structured questionnaires, consent forms and cameras. Formal consents were sent to both the Chief Executive Officer of LVSWSB and the Managing Director KIWASCO. Once Consents were granted, the study participants were approached and overall objective of the study explained to them before they also signed individual consent forms attached to the questionnaire. During data collection, simple random sampling method was used to select the study participants in the facilities or places of interest to the study; Formal introduction was done and the purpose of research, before seeking consents from the respondents.

Some respondents were able fill the questionnaires by themselves while others simply responded inform of interviews. This was done to allow staff to continue working; hence there was no interruption of work. Observations were made during visits to the facilities and photos taken where it was acceptable to the management to back up our data. For self administered questionnaires, respondents were asked few questions to confirm their answers. Ordinal and norminal scales were used in the rating.

3.6 Data processing and analysis

The filled questionnaires were checked and cleaned by verifying the contents for consistency using photographs. The answers were compared with other respondents in

the similar fields for acceptability. The filled questionnaires were checked, edited and coded. They were then entered into Statistical Package for Social Scientist (SPSS) computer program for processing and analysis. Vesely et al. (1981) Severity Rating was used to classify risks as Critical, Major, Minor or Insignificant, or Very High, High, Substantial, Possible or Slight according to Fault Tree Hand book.

Using SPE (Severity Probability Exposure) Risk Assessment Model work sheet, the risk was determined as a function of Severity, Probability and Exposure. Risk = Severity x Probability x Exposure. Severity is the degree of damage from 1-5 where 1 is none or slight, 2 is Minimal, 3 is significant, 4 is Major and 5 is Catastrophic. Probability is the likelihood that the potential consequence will occur. This varies from 1-5 where 1 is impossible, 2 is Unlikely, 3 is 50-50, 4 is greater than 50% and 5 is very likely. Exposure is amount of time, occurrence, number of people expressed from 1-4; where 1is none or below average, 2 is Average, 3 is above average and 4 is great.

3.7 Data validation

The validation process started from research instruments to data content. The data collection staff were trained and allowed to fill the data collection tools as respondents before using the instruments. The data collection instruments were presented and tested by management and sample staff for relevance before finally allowing our teams to administer the questionnaire in the respective areas of study. Informed consent was sought from both employers and individual workers before visiting the facilities.

Validity tests focused on the content for content, criterial for reliability, construct validity by correlation with real situation as observed. The draft report was shared with Lake Victoria South Water Service Board (LVSWSB) and Kisumu Water and Sewerage Company KIWASCO management to confirm that it reflected the situation in the facilities before final report.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents and analyzes the data, interprets the results and discusses them in line with the study objectives before summarizing the findings. The section comprises: Demographic information, Awareness on occupational safety and health among staff and work environment in water service industry in Kisumu County, Occupational safety and health hazards and risk exposure and work environment, Occupational safety and health management practices and work environment in the water service industry and Relationship between occupational safety as well as health practices and workplace environment in the water service industry in Kisumu County.

The study targeted 80 respondents, out whom 76 were reached and their views collected, this gives a questionnaire return rate of 93.82%, which was good enough for analysis and reporting. Mugenda and Mugenda, (2003) noted that a response rate of 50% is acceptable for analysis and adequate for inference purposes.

4.2 Demographic Information

This section analyses, presents and interprets the results findings on the respondents' work organization, ages, gender, highest educational level, duration worked for their corporations and the nature of their work. The results are as shown in table 4.1

This section analyses, interprets, presents and discusses findings in accordance with the first objective of the study; to establish the current level of awareness on occupational safety and health among staff in water service industry in Kisumu County. The respondents were given statements to react to in 5 point Likert Scale where 1-Strongly Disagree (SD), 2-Disagree(D), 3-Neutral(N),4-Agree(A) and 5-Strongly Agree(SA).The results were presented in percentages as shown in Table 4.1 For the purpose of this discussion dissenting opinions were summed up under SD and D; while supporting

opinions were summed up under A and SA.

On the respondents organization of work, majority at 75% worked at KIWASCO, 15.79% worked at LVSWSB while the minority at 7(9.21%) worked at GULF. The diversity in the organization of work though in the same line of operation would enable the researcher to effectively address the objectives.

Preponderance of the respondents at 80.3% were males while the least at 15(19.7%) females. Given that the selection was done randomly, it meant that there were more male than female in the water service industry in Kisumu County.

Most of the respondents at 36.6% were between 29-39 years of age while the same number of respondents forming the minority at 31.6% were both between 18-28 years and 40-50 years of ages. The varied age distribution mean added value to the study, the way they perceived issues around occupational safety and health could be varied.

Preponderance of the respondents at 80.3% had attained college level of education as their highest, 11.8% attained secondary while the minority at 7.9% had attained primary level of education as their highest. This was hence evident that all the respondents were literate enough to understand the questions and accurately respond to them.

On the number of years worked for the organization, substantial population at 35.5% had worked for 4 years, 31.6% had worked 1 year, 19.7% had worked for 3 years while the least number of respondents at 13.2% had worked for 2 years for their organization. This was a good representation due to the experience majority of the respondents had which was an added value to the study.

Preponderance of the respondents at 64.5% stated that water supply was their nature of work, 18.4% stated construction as their nature of work while the minority at 17.1% stated waste water as their nature of work. This was critical because the nature of work had a bearing on the exposure to occupational health and safety issues.

Table 4.1: Demographic Information

Characteristics	Categories	Numbers of respondents	Percentage/ Proportion
Respondents organization	LVSWSB	12	15.79%
	KIWASCO	57	75.00%
	GULF	7	9.21%
Gender of the respondent	Male	61	80.3%
	Female	15	19.7%
Age of the respondent	18-28	24	31.6%
	29-39	28	36.8%
	40-50	24	31.6%
		6	
Respondents Highest level of Education	Primary		7.9%
	Secondary	9	11.8%
	College	61	80.3%
Duration worked With organization			
	One year	24	31.6%
	Two years	10	13.2%
	Three years	15	19.7%
	Four years	27	35.5%
Nature of respondents work	Construction	14	18.4%
	Water supply	49	64.5%
	Waste water	13	17.1%

4.3 Effects of Awareness on occupational safety and health and work environment

The respondents were given statements to react to in 5 point Likert Scale where 1-Strongly Disagree (SD),2-Disagree(D), 3-Neutral(N),4-Agree(A) and 5-Strongly Agree(SA).The results were presented in percentages as shown in Table 4.2. For the purpose of this discussion dissenting opinions were summed up under SD and D; while supporting opinions were summed up under A and SA.

A good number of the respondents at 90.8% (25% for A and 65% for SA) were aware that they had a right to be part of the process of identifying and resolving workplace health and safety concerns, 7.9% were not aware while 1.3% were uncertain. On the right of decision making in the workplace, this study findings were in convergence with one of the occupational Safety and Health Act of 2007 that ensures that every person employed participates in the application and review of safety and health measures in promotion and improvement of occupational safety and health standards.

Majority of the respondents at 88.2% were aware that it was critical for staff to master occupational safety regulations, 6.5% were unaware of this right while 5.3% were undecided whether it was critical for staff to master occupational safety regulations or not. This finding was largely supported by the occupational Safety and Health Act of 2007 objective that states that arrangements for ensuring safety and absence of risks, to health in connection with the use, handling, storage and transport of articles and substances should be in place with the provision of such information, instructions, training and supervision necessary to ensure the safety and health at work of every person employed so as to promote and improve occupational safety and health standards

On the knowledge of safe working procedures, majority of the respondents at 92.1% stated that it was important to know and follow safe work procedures, 5.2% stated that it was not important to know and follow safe work procedures while the least at 2.6% were unsure. This representation was in line with a similar study conducted by (Thobora *et al.,* 2015) that explains that employers should ensure employees are protected from

hazards at work by ensuring that employees are adequately instructed and trained in safe systems of work such as safe methods for carrying out tasks, safe use of equipments or substances, use of health and safety control measures and personal protective equipments, accident reporting and emergency procedures and their responsibilities for health and safety.

It was popular among 93.4% of the respondents that it was important to report injury or illnesses immediately, 5.2% had divergent opinion from opinion from the majority, 1.3% were not sure.

Preponderance of the respondents at 90.8% stated that workers should be instructed to follow safe working practices, 6.6% had divergent opinion from the majority, 2.6% were undecided. A similar study carried out by Thobora *et al.* (2015) supported this finding by explaining that employees need to be adequately instructed and trained in safe systems of work such as safe methods for carrying out tasks, safe use of equipments or substances, use of health and safety control measures and personal protective equipments, accident reporting and emergency procedures and their responsibilities for health and safety.

Substantial respondents at 44.7% had not undertaken any training on occupational health and safety at the workplace, 44.4% had been trained on occupational health and safety with the least at 11.8% being unsure. A similar study findings by Thobora *et al.* 2015 differed with the study findings and recommended that employees need to be adequately instructed and trained in safe systems of work such as safe methods for carrying out tasks, safe use of equipment or substances, use of health and safety control measures and personal protective equipment, accident reporting and emergency procedures and their responsibilities for health and safety. Employers are expected to carry out training needs analysis and then provide to employees in appropriate languages: the information, instruction, training and supervision necessary for them to work safely. In identifying training and literacy of the employees, the plant and substances used, hazards identified and risk assessment conducted.

The study findings were also in divergence with a similar study findings according to Wallerstein and Weinger (1992),which revealed that there are three major problems that need to be addressed before the field of worker health and safety education can advance, that is the: lack of clarity and consensus on the goals of worker education; lack of standards for effective teaching methods, including the lack of skills in these methods of the people who deliver the trainings and inadequacy of program evaluation. Wallerstein *et al*. (1992) further explains that behavioral approach is based on faulty assumptions that people learn better through discrete chunks of knowledge in a linear sequence unlike cognitive emphasis on problem solving, critical thinking capability and one's belief that one can utilize the knowledge learned; and the second assumption that improved behaviors always lead to a safer more healthful workplace. They concluded that Competency based program which teach skills to perform one's job safely, to the exclusion of a critical understanding of workplace relationships or structures, are on the increase. Our findings divergence could be on culture of both management and staff as a basis of the problem.

It was popular among 73.7% of the respondents, to know the right to refuse hazardous work, 15.8% were unsure while the minority at 10.5% were not aware of this right.

Majority of the respondents at 75% were aware that members of health and safety committee had the right to stop work that is dangerous to any worker, 15.8% were not aware of this right while the minority at 7(9.2%) were undecided. This was in convergence with a similar study, (ILO, 2013) that revealed that according to the history of OSH in Kenya that dates back to 1950, it was found necessary to have a legal instrument to manage the safety, health and welfare of people employed in factories. The then colonial government adopted the British Factories Act of 1937 which was later amended in 1990 to the Factories and Other Places of Work Act, in order to enlarge its scope of coverage. In 2007 this Act was repealed, and replaced by the Occupational Safety and Health Act with the enactment of the Work

Injury Benefits Act in the same year. Both these laws are administered by the Directorate of Occupational Safety and Health Services (DOSHS). Other legislation that touches on OSH includes the Public Health Act CAP 242, the Environmental Management and Coordination Act (1999), the Radiation Protection Act CAP 243, and the Pest Control Products Act Cap 346. These laws are enforced by different ministries and departments of the Government in managing the safety, health and welfare of employed population.

Preponderance of the respondents at 84.2% were aware that workers and employers while the minority at 6.6% were undecided.

Table 4.2: Effects of Awareness on occupational safety and health and work environment

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)
I am aware of existence of Safety and Health Act of 2007	7.9%	7.9%	11.8%	40.8%	31.6%
I have a right to know about any potential hazard to which I may be exposed at the Workplace	5.3%	2.6%	1.3%	25%	65.8%
I have a right to be part of the process of identifying and resolving workplace health and safety concerns	6.6%	1.3%	1.3%	36.8%	53.9%
It is critical for staff to master occupational safety regulations	2.6%	3.9%	5.3%	31.6%	56.6%
It is important to know and follow safe work Procedures	3.9%	1.3%	2.6%	26.3%	65.8%
It is important to report injury or illnesses Immediately	1.3%	3.9%	1.3%	19.7%	73.7%
Workers should be instructed to follow safe working practices	1.3%	5.3%	2.6%	35.5%	55.3%
I have had a training on occupational health and safety at the workplace	27.6%	17.1%	11.8%	28.9%	14.5%
I have a right to refuse hazardous work	6.6%	3.9%	15.8%	30.3%	43.4%
In certain circumstances, members of a health and safety committee have the right to stop work that is dangerous to any worker	7.9%	7.9%	9.2%	31.6%	43.4%
Workers and employers must share the responsibility for occupational health and safety	6.6%	2.6%	6.6%	36.8%	47.4%

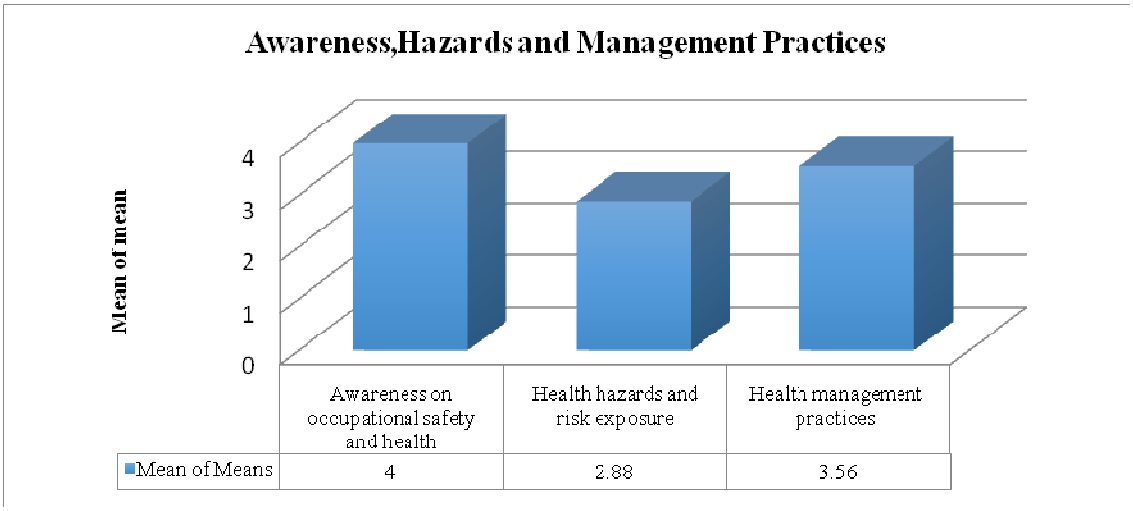

Figure 4.1: Awareness, Hazards and Management

4.4 Impacts of Occupational Safety and health hazards and risk Exposure in the work environment

This section analyses, interprets, presents and discusses findings in relation to the second objective of the study; to determine effects of occupational safety and health hazards exposure on work environment in water service industry in Kisumu County. The respondents were given statements to react to in 5 point Likert Scale where 1-Strongly Disagree (SD),2-Disagree(D), 3-Neutral(N),4-Agree(A) and 5-Strongly Agree(SA).The results were presented in percentages as shown in Table 4.4. For the purpose of this discussion dissenting opinions were summed up under SD and D; while supporting opinions were summed up under A and SA.

Average number of respondents at 50%; that is 34.2% (SD) and 15.8% (D), stated that they had no previous accidents or injuries in the workplace, 42.1% (30.3% and 11.8%) confirmed previous accidents or injuries in the workplace while the minority at 7.9% were undecided. A similar study conducted by Ng'anga *et al.* (2013), revealed that the construction industry's appalling health and safety record is a worldwide problem affecting both the developed and developing countries. Very few statistics though exist

on the nature of accidents and injuries affecting workers in developing countries primarily due to the poor or nonexistence of regulatory framework. However, health and safety data collected in developed countries show a consistent pattern for worker fatalities and injuries. As the nature of construction works is similar in both developed and developing countries, the problems reported in the industrialized world do not appear particularly "high tech". As the data from developing countries are so scarce it would appear reasonable to assume that the types of fatalities and injuries are similar worldwide.

It was popular among 57.9% not to have experienced any trauma in the workplace, 27.7% had experienced while 14.5% were not certain whether they had experienced any trauma in the workplace or not.

Substantial respondents at 46.1% did not experience a change in the way their body functions, grows or develops, 31.6% had while the minority at 22.4% were unsure whether they had a change in the way their body functions, grows or develops or not. More than one half of the respondents at 55.3% had not experienced a change in mental condition resulting from stress, traumatic experience or exposure to solvents, 26.3% had experienced a change in mental condition resulting from stress, traumatic experience or exposure to solvents with the minority at 18.4% were undecided.

More than one half of the respondents at 54% stated that there was no risk of an object falling from a height (potential or gravitational energy), 39.5% stated that there was a risk of an object falling from a height with the least number of respondents at 6.6% were undecided.

Less than one half of the respondents at 44.7% said that there was no risk of a run-away chemical reaction or a release of compressed gas or steam, 39.5% stated that the risk was present while the least number of respondents at 15.8% were unsure. It was revealed from a similar study according to Ng'ang'a *et al.* (2013), that waste water may contain potentially hazardous chemicals depending on the source of water quality,

drinking water treatment processes and industries discharging to the sewer, including chlorinated organic solvents and pesticides, PCB's, polycyclic aromatics, petroleum hydrocarbons, flame retardants, nitrosamines, heavy metals, asbestos, dioxins and radioactive materials.

Majority of the respondents at 79% said that exposure to hazards in the workplace always caused injury, illness or other adverse health effects in the workplace, 17.1% stated that exposure to hazards in the workplace always caused injury, illness or other adverse health effects in the workplace while minority at 3.9% were unsure. This study findings was largely supported by a similar study carried out by Ng'ang'a *et al.*(2013), that established that there are aspects of work environment that have the potential of causing immediate and sometimes violent harm to a worker including poorly maintained equipments, unsafe machineries, and exposure to hazardous chemicals among others. Potential injuries include loss of hearing, eye sight or body like cuts, burns, bruises, broken bones and electric shock.

More than one half of the respondents at 63.2% stated that there was adequate and good lighting at the workplace, 27.7% noted that it was inadequate or poor lighting while the minority at 9.2% were unsure.

Most of the respondents at 42.2% stated that there was a likelihood that the injury, disease or damage was resulting from exposure to a hazardous condition at the workplace, 34.2% had divergent opinion while 23.7% were undecided. A related study supported this finding by establishing that the types and frequencies of injuries that occur to construction workers do vary according to the tasks that they carry out such as falls, overexertion or strenuous movement, handling falling or flying objects, contacts with stationery objects (Missed steps), contact with moving objects, contact with heat or cold , contact with chemicals, exposure to electricity, fire, explosions or blasts (Larcher *et al.,* 1999).

The respondents were asked to state the types of hazards they are exposed to at the workplace. The same number of respondents at 23.7% stated that they were exposed to biological and chemical hazards at the workplace, 18.4% stated physical, 13.2% stated ergonomic 11.8% stated psychological while the minority at 9.2% stated that they were exposed to safety hazards at the workplace. It was established from a related study by Ng'ang'a *et al.* (2013), that the occupational health and safety impacts associated with the operational phase of water and sanitation projects include; accidents and injuries, chemicals exposures, hazardous atmosphere, exposure to pathogens and vectors and noise. The study further established that the workers may be exposed to hydrogen sulfide, methane, carbon monoxide chloroform and other chemicals generated during waste water treatment. Oxygen may be displaced or consumed by microorganisms, thus resulting in areas where wastewater or wastewater residues are processed.

Table 4.3: Impacts of Occupational Safety and health hazards and risk exposure and work environment

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)
I have had any previous accidents or injuries in the workplace	34.2%	15.8%	7.9%	30.3%	11.8%
I have experienced any trauma in the Workplace	26.3%	31.6%	14.5%	21.1%	6.6%
I have had a change in the way my body functions ,grows or develops	25.0%	21.1%	22.4%	21.1%	10.5%
I have had a change in mental condition resulting from stress, traumatic experience or exposure to solvents	22.4%	32.9%	18.4%	11.8%	14.5%
There is a risk of an object falling from a height(potential or gravitational energy)	32.9%	21.1%	6.6%	22.4%	17.1%
There is a risk of a run-away chemical reaction or a release of compressed gas or steam	15.8%	28.9%	15.8%	17.1%	22.4%
Exposure to hazards in the workplace always causes injury, illness or other adverse health effects in the workplace.	5.3%	11.8%	3.9%	32.9%	46.1%
There is inadequate or poor lighting at the Workplace	31.6%	31.6%	9.2%	14.5%	13.2%
There is a likelihood that the injury, disease or damage is resulting from exposure to a hazardous condition at the workplace	10.5%	23.7%	23.7%	21.1%	21.1%

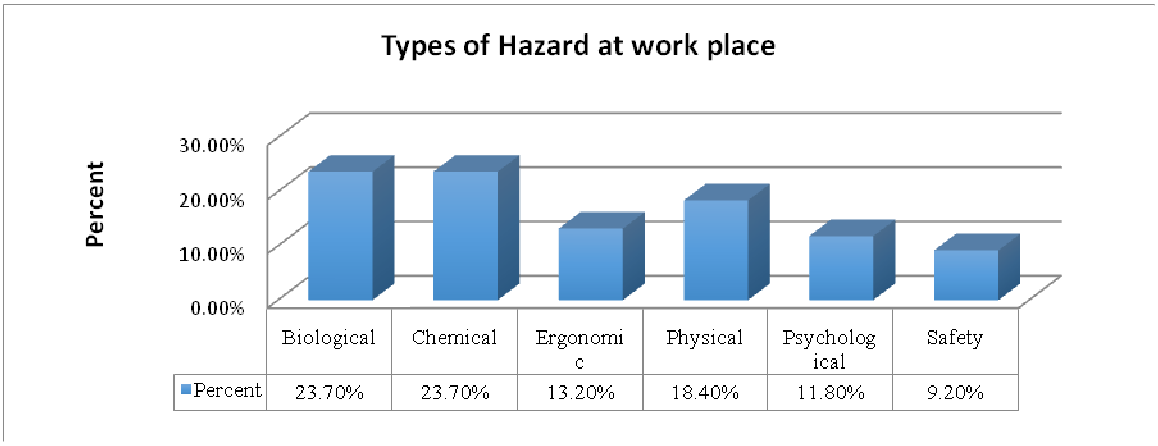

Figure 4.2: Rating of Types of Hazards and Risk exposure in the work environment

4.4.1 Risk Rating in the water sector

Severity of the hazards in the water sector is considered catastrophic due to the population at risk. The population of coverage in most urban centers falls in this category for biological and chemical risks in the water supplies.

In ergonomics, physical, psychological and safety hazards/ risks are significant due to their impacts on workers or water supply operators. While the probability is considered 50% exposure is great because of existence of the forms of risks and hazards in the water sector.

Table 4.4: Water Sector Risk Severity Rating

Risk	Severity	Probability	Exposure	SPE Value	Remarks & Guidance
Biological	5	3	4	60	High Risk- Correct Immediately
Chemical	5	3	4	60	High Risk- Correct Immediately
Ergonomics	3	3	4	36	Possible Risk- Needs attention in the near future
Physical	3	3	4	36	Possible Risk- Needs attention in the near future
Psychological	3	3	4	36	Possible Risk- Needs attention in the near future
Safety	3	3	4	36	Possible Risk- Needs attention in the near future

According to Vesely *et al.* (1981); the SPE Risk Assessment Model worksheet assesses risks for specific hazards by determining risk as a function of Severity, Probability and Exposure. Risk = f(SPE)

Vesely *et al.* (1981) indicate Severity range from 1 to 5: such that 1= None or Slight; 2= Minimal; 3=Significant; 4=Major; 5 =Catastrophic. The same report shows that Probability is also rated from 1-5 thus;1=Impossible; 2=Unlikely in normal circumstances; 3= 50%; 4= Greater than 50%; 5=Vey likely; And finally Exposure is rated from 1-4 thus;1=None;2=Average;3=Above average;4= Great.

4.5 Effects of Occupational safety and health management practices and work environment

This section analyses, interprets, presents and discusses findings on the third objective of the study: To evaluate the impact of occupational safety and health awareness and training on work environment in water service industry in Kisumu County. The respondents were given statements to react to in 5 point Likert Scale where 1-Strongly Disagree (SD), 2-Disagree(D), 3-Neutral(N),4-Agree(A) and 5-Strongly Agree (SA).The findings are presented as percentages in Table 4.5.

Majority of the respondents at 77.6% (50% for A and 27.6% for SA) stated that the employer enforced health and safety regulations, 14.4% had divergent opinion from the majority, 7.9% were undecided whether the employer enforced health and safety regulations or not.

More than half of respondents at 71.1% (50% for A and 21.1% for SA) noted that the employer corrected unsafe acts and unsafe conditions, 15.8% stated that the employer did not correct unsafe acts and unsafe conditions with the least number of respondents at 13.2% being undecided.

A bout half of the respondents at 53.9% said that there was always orientation program for new staff on health and safety, 27.6% stated that there was no orientation program for new staff on health and safety with the minority at 18.4% being unsure.

Most of the respondents at 69.8% stated that the employer ensured that only authorized, adequately trained workers operated equipment, 18.4% had divergent opinion from the majority while 11.8% were undecided.

It was popular among 71% of the respondents that the employers ensured that the equipment were properly maintained, similar 14.5% had divergent opinion from the majority with others being undecided.

More than three quarters of the respondents at 76.3% stated that the employer promoted safety awareness and information among staff, 13.2% stated that the employer had not promoted safety awareness and information among staff,10.5% respondents were unsure if safety awareness and information among staff was promoted.

More than half of the respondents at 63.1% noted that the employer provided medical and remedial first aid facilities, 21.1% were not sure, with the least respondents at 15.8% stating that the employer did not provide medical and remedial first aid facilities.

Most of the respondents at 67.1% stated that the employer ensured that personal protective equipment were available to all staff all the time, 18.4% were undecided, while the minority at 14.5% noted that employer did not ensure that personal protective equipment were available to all staff all the time.

Substantial respondents at 44.7% stated that there was an emergency response plan on health and safety, 31.6% were undecided and 23.7% noted that there was no emergency response plan on health and safety.

Half of the respondents at 50% noted that the assessments were usually done to identify risks and hazards in the workplace, 30.3% were undecided while the minority at 19.7% stated that the assessments were not done to identify risks and hazards in the workplace.

Nearly half of the respondents at 48.7% stated that performance on health and safety in their workplace was regularly evaluated, 30.3% were undecided while the least number of respondents at 21% stated that performance on Health and safety was not evaluated regularly. This representation was in line with a similar study conducted by Thobora *et al.* 2015 that revealed that employers are expected to carry out training needs analysis and then provide to employees in appropriate languages: the information, instruction, training and supervision necessary for them to work safely. In identifying training and literacy of the employees, the plant and substances used, hazards identified and risk assessment conducted.

More than half of the respondents at 52.7% noted that health and safety committee constituted by staff met regularly to review health and safety at the workplace, 27.7% had divergent opinion from the majority, 19.7% of the respondents were unsure. This is in agreement with WASREB, 2015 report that both very large and large utilities have maintained acceptable levels of staff productivity due to water sector reforms under the Water Act 2002.This has seen heavy investments that have since revived formerly dilapidated infrastructure. The introduction of WASREB regulations on performance of utilities by agents could be contributing to the progress.

Table 4.5: Effects of Occupational safety and health management practices and work environment

Statements	SD (%)	D (%)	N (%)	A (%)	SA (%)
The employer enforces health and safety Regulations 10.5%		3.9%	7.9%	50.0%	27.6%
The employer corrects unsafe acts and unsafe Conditions	7.9%	7.9%	13.2%	50%	21.1%
There is always orientation program for new staff on health and safety	15.8%	11.8%	18.4%	35.5%	18.4%
The employer ensures that only authorized, adequately trained workers operate equipment	6.6%	11.8%	11.8%	38.2%	31.6%
The employers ensures the equipment are properly maintained	2.6%	11.8%	14.5%	51.3%	19.7%
The employer promotes safety awareness and information among staff	3.9%	9.2%	10.5%	51.3%	25%
The employer provides medical and remedial first aid facilities	9.2%	6.6%	21.1%	35.5%	27.6%
The employer ensures that there that personal protective equipment were available to all staff all the time	9.2%	5.3%	18.4%	44.7%	22.4%
There is an emergency response plan on health and safety	13.2%	10.5%	31.6%	32.9%	11.8%
Assessments are usually done to identify risks and hazards in the workplace	7.9%	11.8%	30.3%	36.8%	13.2%
Performance on Health and safety is regularly evaluated in our workplace	9.2%	11.8%	30.3%	34.2%	14.5%
There is a health and safety committee constituted by staff which meets regularly to review health and safety at the workplace	6.6%	21.1%	19.7%	30.3%	22.4%

4.6 Relationship between occupational safety and health practices and workplace environment

This section analyses, interprets and discusses the findings in relation to the fourth objective of the study: to establish the relationship between occupational safety and health practices and workplace environment in the water service industry in Kisumu County.

4.6.1 Relationship between awareness on OSH and Work environment

The study analyzed the relationship between staff awareness of occupational safety and health and work environment using Spearman's rho coefficient, Confidence Level (CL) = 95%, Spearman's Correlation assess monotonic relationships, whether linear or not. It is appropriate for both continuous and discrete ordinal variables. It measures the strength and direction of association between two ranked variables. It was established that there is a significant moderate positive relationship between staff awareness of occupational safety and health and work environment in the water service industry in Kisumu County. This meant that by enhancing awareness among staff on the occupational safety and health, the work environment would become more conducive. This may be confirmed by Bandura, (1989) that People tend to select activities and associates from the vast range of possibilities in turns of their acquired preferences and competencies. He confirms that the natural and extrinsic effects of their actions in turn, partly determine their thought, patterns and emotional reactions in workplace.

Table 4.6: Relationship between awareness on OSH and Work environment

Analysis Technique	Variables	Descriptors	OSH Awareness	Work Environment
Spearman's Rho	OSH Awareness	Correlation Coefficient	1.000	.363
		Sig. (2-tailed)	.	.001
		N	76	76
	Work Environment	Correlation Coefficient	.363	1.000
		Sig. (2-tailed)	.001	.
		N	76	76

4.6.2 Relationship between exposure to hazards and risks, and work environment

The study analyzed the relationship between exposure to hazards and risks and work environment. It was established that there is an insignificant weak negative relationship between exposure to hazards and risks and work environment. This meant that if the exposure to hazards and risks are reduced the work environment would improve.

Ng'ang'a *et al*. (2013) explains the indirect proportionality; that there are aspects of work environment that have the potential of causing immediate and sometimes violent harm to a worker hence affecting performance; these include poorly maintained

equipments, unsafe machineries, and exposure to hazardous chemicals among others.

Table 4.7: Relationship between exposure to hazards and risks, and work environment

Analysis Technique	Variables	Descriptors	Exposure to Hazards& Risk	Work Environment
Spearman's Rho	Exposure to Hazards & Risk	Coefficient Sig. (2-tailed)	.	.413
		N	76	76
		Correlation Coefficient	-.095	1.000
	Work Environment	Sig. (2-tailed)	.413	.
		N	76	76

4.6.3 Regression analysis on OSH management practice and Work environment

The study analyzed the relationship between occupational safety and health management practices and work environment. It was established that there is a significant relationship between occupational safety and health management practices and the work environment. This meant that if the OSH management practices were strengthened then the work environment would improve. Njuguna, (2007) explained that when workers are well motivated they behave safely at workplace, this minimizes the human error that may cause or create unsafe working environment.

Table 4.8: Regression analysis OSH management practice and Work environment

Analysis Technique	Variables	Descriptors	OSH Management Practices	Work Environment
Spearman's Rho	OSH Management Practices	Correlation Coefficient	1.000	.690
		Sig. (2-tailed)	.	.000
		N	76	76
	Work Environment	Correlation Coefficient	.690	1.000
		Sig. (2-tailed)	.000	.
		N	76	76

The study conducted a logistic regression analysis to ascertain the relationship between the dependent and the independent variables pulled together but holding the rest constant each time. It was established that practicing occupational safety and health would increase the chances of conducive working environment in the water service industry in Kisumu County.

It was also established that if the employees are aware of occupation safety and health, then they are less likely to perceive their work environment as conducive. Exposure to hazards and risks reduced the likelihood for conducive work environment in the water service industry in Kisumu County.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings of the main study, conclusions, recommendations arrived at and contribution to body of knowledge.

5.2 Summary of findings

On the current level of knowledge on Occupational Safety and Health, the study established substantial level of awareness on Occupational Safety and Health Act of 2007 in the water sector in Kisumu County.

On the effects of Occupational Safety and Health hazards exposure on work environment, the study found that if the exposure to hazards and risks are reduced, the work environment improves in the water sector in Kisumu County.

Impacts of Occupational Safety and Health management practices like awareness and training; were noticed when strengthened with improved work environment, hence a boost in the workplace satisfaction. The employee practices (enforces) health and safety regulations in the water sector in Kisumu County.

In establishing relationship between Occupational Safety and Health –Awareness, training and hazards' exposure; and employee satisfaction in the work place, the study established that there is a significant relationship between occupational safety and health management practices and the work environment in the water sector in Kisumu County.

5.3 Conclusions

This research concludes that staff are aware of the occupational safety and health provisions at the work place and the employer practices Occupational Safety and Health by enforcing applicable regulations in the water industry in Kisumu County. The

employees were exposed to hazards and risks; Both Biological and Chemical risks are substantial in the water sector; while Ergonomics, Physical, Psychological risks are minor but are likely to happen. And finally practicing Occupational Safety and Health increases conducive work place environment in the water sector industry in Kisumu County.

5.4 Recommendations

1. The management of water service industry should give immediate attention to Biological and Chemical risks, while other risks also need attention in the near future.

2. The management of the water service industry should increase staff sensitization on hazards and risks of Occupational Safety and Health in the water sector.

3. The water sector should improve the management practices on Occupational Safety and Health in the water service industry especially in the hazards mitigation practices, education and training.

5.5. Areas for further research

This study recommends:-

Further studies to establish the impact of the current biological and chemical risks among staff in the water sector industry.

Further study to establish the direction and magnitude of relationship between Occupational Safety and Health and work environment in the water sector.

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APPENDICES

Appendix A: Questionnairre

Halo Respondent**!** My name is Ibrahim Oluoch. I am a student at Jomo Kenyatta University of Science and Technology. I am undertaking a study as partial fulfillment for my Master of Science in Occupational Health and Safety. This study seeks to ASSESS THE INFLUENCE OF OCCUPATIONAL HEALTH AND SAFETY PRACTICES ON WORK ENVIRONMENT IN WATER SERVICE INDUSTRY IN KISUMU COUNTY KENYA

Your participation in the study will help in achieving better workplace environment through proper occupational health and safety practices. This questionnaire is purely for academic purposes. The information provided here will be handled with maximum confidentiality.

This section captures data on the respondent characteristics .Please tick ☑ in the box of your chosen response.

SECTION A:BIODATA

1. Name of sub-county…….
2. Name of employer
   LVSWSB ☐ KIWASCO ☐ GULF ☐
3. Gender of the respondent
   Male ☐ Female ☐
4. What is your age
   18-28 ☐ 29-39 ☐ 40-50 ☐ over 50 ☐
5. Highest level of education
   None ☐ Primary ☐ Secondary ☐ College ☐
6. How long have you worked for this organization
   Less than 2 years ☐ 2-4 years ☐ 4-6 years ☐ over 6 years ☐
7. What is the nature of your work?
   Construction ☐ Water supply ☐ Waste water ☐

Instructions: The coming sections contain a list of questions that ask about your experiences with the occupational security and health at your workplace. The responses are given in Likert scale with scores 1 is strongly disagree(SD),2 is disagree(D), 3 is neutral(N), 4 Agree (A),5 is strongly agree (SA) Please circle (√) the appropriate response. There **is no right or wrong answers**, If you need to change an answer, make an "X" through the error and then (√) your true response.

SECTION B: LEVEL OF AWARENESS ON OCCUPATIONAL SAFETY AND HEALTH

Statement	1(SD)	2(D)	3(N)	4(A)	5(SA)
1. I am aware of existence of Safety and Health Act of 2007					
2. I have a right to know about any potential hazard to which I may be exposed at the workplace					
3. I have a right to be part of the process of identifying and resolving workplace health and safety concerns					
4. It is critical for staff to master occupational safety regulations					
5. It is important to know and follow safe work procedures					
6. It is important to report injury or illnesses immediately					
7. Workers should be instructed to follow safe working practices					
8. I have had regular training on occupational health and safety at the workplace					
9. I have a right to refuse hazardous work					
10. In certain circumstances, members of a health and safety committee have the right to stop work that is dangerous to any worker					
11. Workers and employers must share the responsibility for occupational health and safety					

SECTION C: OCCUPATIONAL SAFETY AND HEALTH HAZARDS					
Statement	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1. Have you had any accidents or injuries in the workplace?					
2. Have you experienced any trauma in the workplace?					
3. Have you had a change in the way your body functions ,grows or develops?					
4. Have you had an impact on condition resulting from stress, traumatic experience or exposure to solvents?					
5. Is there a risk of an object falling from a height(potential or gravitational energy)?					
6. Is there a risk of a run-away chemical reaction or a release of compressed gas or steam?					
7. Does Exposure to hazards in the workplace always cause injury, illness or other adverse health effects?					
8. There is inadequate or poor lighting at the workplace					
9. There is a likelihood that the injury, disease or damage resulting from exposure to a hazardous condition at the workplace					
10. What types of hazards are you exposed to at the workplace? Biological ☐ Chemical ☐ Ergonomic ☐ Physical ☐ Psychological ☐ Safety ☐					
SECTION D: OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PRACTICES					
Statement	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1. The employer enforces health and safety regulations					
2. The employer corrects unsafe acts and unsafe conditions					
3. There is always orientation program for					

new staff on health and safety					
4. The employer ensures that only authorized, adequately trained workers operate equipment					
5. The employers ensures the equipment are properly maintained					
6. The employer promote safety awareness information among staff					
7. The employer provides medical and first aid facilities					
8. The employer ensures that there that personal protective equipment are available to all staff all the time					
9. There is an emergency response plan on health and safety					
10. Assessments are usually done to identify risks and hazards in the workplace					
11. Performance on Health and safety is regularly evaluated in our workplace					
12. There is a health and safety committee constituted by staff which meets regularly to review health and safety at the workplace					

SECTION E: WORKPLACE ENVIRONMENT AND EMPLOYEE MOTIVATION

Statement	**1(SD)**	**2(D)**	**3(N)**	**4(A)**	**5(SA)**
1. I am satisfied with my work environment					
2. I am proud to be working for this organization					
3. I am willing to work harder than I have to help this organization succeed					
4. I feel high loyalty to this organization					

Appendix B: List of Plates

Photo taken at Yala water treatment works

Plate 4.1: New water treatment plant under construction

Photo taken at Yala Water Treatment site

Plate 4.2: Chlorine dozing equipment

Photo taken along Kisumu Siaya road

Plate 4.3: Gravity main pipeline construction works.

Photo at the new storage tank

Plate 4.4: Mason worker on ladder

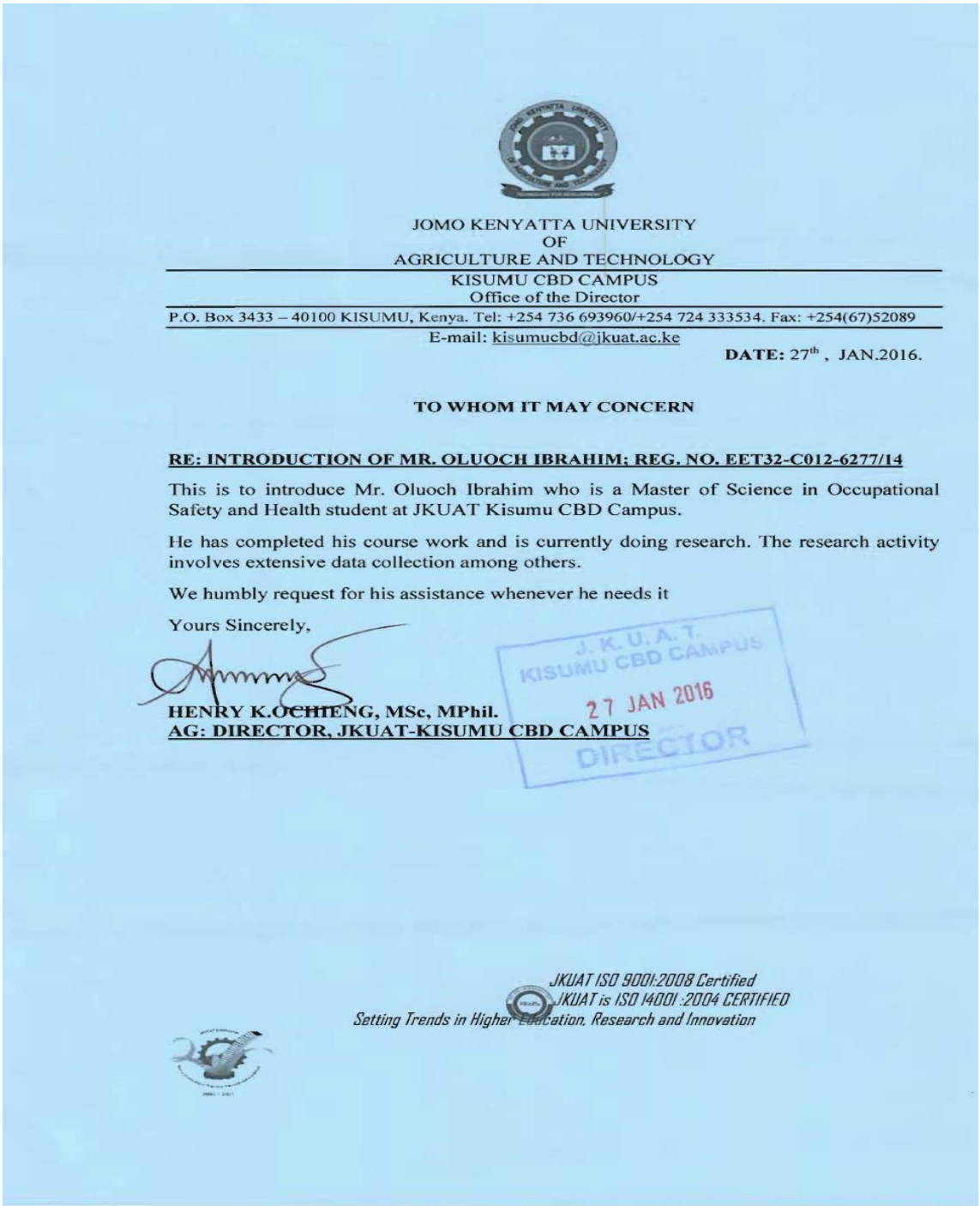
Photo taken at KIWASCO Administrative block

Plate 4.5: Firefighting equipment

Photo taken at Contractor's campsite

Plate 4.6: Safety warning sign

Appendix C: Introduction of Mr. Ibrahim Oluoch



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DATE: 27th , JAN.2016.

TO WHOM IT MAY CONCERN

RE: INTRODUCTION OF MR. OLUOCH IBRAHIM; REG. NO. EET32-C012-6277/14

This is to introduce Mr. Oluoch Ibrahim who is a Master of Science in Occupational Safety and Health student at JKUAT Kisumu CBD Campus.

He has completed his course work and is currently doing research. The research activity involves extensive data collection among others.

We humbly request for his assistance whenever he needs it

Yours Sincerely,

J. K. U. A. T.
KISUMU CBD CAMPUS
27 JAN 2016
DIRECTOR

HENRY K.OCHIENG, MSc, MPhil.
AG: DIRECTOR, JKUAT-KISUMU CBD CAMPUS

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Appendix D: Consent Explanation and Consent Forms

Introduction

This research study is being conducted by Ibrahim Oluoch, a postgraduate student at Jomo Kenyatta University of Agriculture and Technology pursuing Master's Degree in Occupational Safety and Health. His study entails the assessment of Occupational Safety and Health practices in the water industry.

Procedures

You will be asked to complete a questionnaire. The questionnaire consists of parts (A, B, C, D) and will take you approximately 30 minutes. Questions will include details about your demographics, awareness about Occupational Safety and Health, work practices and policy guidelines.

Risks/Discomforts

There are minimal risks for participation in this study. However, you may feel emotional discomfort when answering some few questions on practices.

Benefits

There are no direct benefits to subjects. However, it is hoped that your participation will help the researcher to come up with recommendations on occupational safety and health of workers in water industry.

Confidentiality

All information provided will remain confidential and will only be reported as group data with no identifying information. All data, including questionnaires will be kept in a

secure location and only those directly involved with the research will have access to them. After the research is completed, the questionnaires will be destroyed.

Questions about the Research

If you have questions regarding this study, you may contact Ibrahim Oluoch at Mobile 0728-149-878, email ibrahim_oluoch@yahoo.com , Dr. Njogu, P.M., Mobile 0723538887, email njogupl@yahoo.com and Dr. Ndeda Jared, email jndeda6060@gmail.com of Jomo Kenyatta University of Agriculture and Technology, Kenya.

Appendix E: Consent to Serve as a Subjecti Research

I Mr./ Miss…….consent to serve as a subject in the study entitled:……

…..……

The nature and general purpose of the research procedure and the known risks/discomfort involved have been explained to me. The investigator is authorized to proceed on the understanding that I may terminate my services at any time I so desire. I have read, understood, and received a copy of the above consent and desire of my own free will and volition to participate in this study. I believe that reasonable safeguards have been taken to minimize both known and the potentially unknown risks.

Participant's signature ……..……..……. Date ……

Name of person obtaining the consent

……

Signature…… Date…….

Witness……..…. Date…….

Appendix F: Publications

Oluoch. I., Njogu. P., and Ndeda, H.O.J. (2017). Effects of Occupational Safety and Health Hazards' Exposure on Work Environment in the Water Service Industry within Kisumu County Kenya. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT*), Volume 11, Issue 5 version 1, pp 46-51. http://www.iosrjournals.org/iosr-jestft/pages/11(5)version-1.html

Oluoch. I., Njogu. P., and Ndeda, H.O.J. (2017). Effects of Occupational Safety and Health Management Practices on Work Environment in the Water Service Industry within Kisumu County –Kenya, *International Journal of Science and Research (IJSR), Volume 6, Issue 5.*

Oluoch. I., and Ndeda, H.O.J. (2017). Effect of Occupational Safety and Health Awareness on Work Environment in the Water Service Industry within Kisumu County - Kenya**.** *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)* e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 11, Issue 6 Ver. I (June. 2017), PP 35- 41.www.iosrjournals.org.

Oluoch. I., and Ndeda, H.O.J. (2017). Relationship between Occupational Safety and Health, and staff satisfaction in the Water Service Industry in Kisumu County - Kenya**.** *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)* e-ISSN: 2319-2402,p-ISSN: 2319-2399.Volume 11, Issue 6 Ver. I (June. 2017), PP 42-49 www.iosrjournals.org