Factors Affecting Occupational Safety and Health Performance in Public Dispensaries and Health Centres in Machakos County, Kenya

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DECLARATION

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

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DEDICATION

This work is dedicated to my late brother, Joseph Ndung'u Njogu, and his wife Margaret Wanjira for their parental care, guidance, encouragement, and support. Rest in eternal peace, my brother and friend. To my Sister In-law, God bless you with strength and good health.

A special dedication goes to my wife, Teresa Nyambura, and children: Samuel, Julia, Margaret, and John for their love, encouragement, support, and prayers all through this work.

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I would also like to thank the Machakos County Commissioner, County Director of Health Services, Sub-County Medical Officers, and the in-charges of the health facilities studied for allowing me to conduct this research in the study area. I am greatly indebted to all those who participated in the study for their time and providing the information sought. This research could not have been a success without their assistance.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BSI	British Standardization Institute
CDC	Center for Disease Prevention and Control
CHMT	County Health Management Teams
EU	European Union
GOK-OSHA	Government of Kenya - Occupational Safety and Health Act
HAI	Health Care-Associated Infection(s)
HM	Health Management
HSA	Health and Safety Authority
HSE	Health and Safety Executive
MHIS	Machakos Health Information System
HW	Health Worker
ILO	International Labour Organization
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KMOH	Kenya Ministries of Health
MIOSHA	Michigan Occupational Safety & Health Administration
MOH	Ministry of Health
MCH	Mother and Child Health
NPBA	National Planning and Building Authority
OSH	Occupational Safety and Health
OSHMS	Occupational Safety and Health Management System
OSHA	Occupational Safety and Health Administration
SCHMT	Sub-County Health Management Teams
SD	Standard Deviation
SHC	Safety and Health Committee
SPSS	Statistical Package for the Social Sciences
US	United States
VIF	Variance Inflation Factors

WHO World Health Organization

ABSTRACT

The Kenya Occupational Safety and Health Act (GOK-OSHA) mandates employers to ensure and maintain the highest standards of occupational safety and health (OSH) in their workplaces. However, occupational incidents persist in public health facilities. This research aimed to assess adequacy of various elements of work environments; OSH awareness within the health workforce and Management; Management commitment; and workers' participation in OSH practices in public dispensaries and health centres within Machakos County. Stratified and random sampling methods were adopted to determine the health facilities and health workers to be included in the study. The study was a cross-sectional survey conducted in January and February, 2018 and involved 21 health facilities, 42 members of the Health Management, and 107 health workers in Machakos County. Linear dimensions and angles were measured, areas and air volumes computed, data collected from respondents, and observations made in the workplaces. Regression coefficients showed strong positive relationships between each of the independent variables and OSH performance. The prediction factors were 0.6810, $p<0.05$ for management commitment; 0.6680, $p<0.05$ for OSH awareness; and 0.6600, $p<0.05$ for workers' participation. The null hypothesis was rejected in the *t*-test. The study concluded that lack of adequate OSH elements of work environment, OSH awareness among health workers and Management, Management commitment, and workers' participation affected OSH performance in public health facilities. The Health Management and workers should be trained specifically in OSH, and exercise their mandates to improve OSH performance in the dispensaries and health centres.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Occupational safety and health is a study domain which focuses on the prevention of injuries and ill-health at work through the provision of suitable conditions of employment to attain and maintain the highest level of health of all workers (International Labour Organization [ILO], 2011 p.1). Protecting workers is a deliberate ILO mandate to safeguard their safety and health from disregard, and to ensure that occupational illness, injury, or both do not provide reason for making workers lose their employment (ILO, 2010).

The global population of health workers was approximately 43 million in the year 2013 and is projected to be about 67.3 million by the year 2030 (World Health Organization [WHO], 2016). These employees need protection from a variety of hazards (WHO, 2010) which they face at work quite often (Alli, 2008). Healthcare workers are at risk of exposure to harmful physical, chemical and biological agents as well as violence, lethargy, and musculoskeletal strains (European Union [EU], 2011).

Hazardous working conditions contribute considerably to morbidity and mortality among health workers arising from occupational illness and injury (Ndejjo *et al.*, 2015). Ill-health and fatality result in loss of skilled health personnel (Occupational Safety and Health Administration [OSHA], 2013a) and cause immense human suffering and financial burden (EU, 2011) to families, communities, organizations, and governments (ILO, 2010).

Healthcare settings post more lost-work-day cases each year, and the probability of employees in healthcare suffering injury is higher than in other sectors (OSHA, 2013a). The incidence of occupational illnesses and injuries in hospitals of the United States (US) was 68 cases per 1000 regular employees in the year 2011 (OSHA, 2013a).

In the US, Healthcare-Associated Infections (HAIs) exceeding 1.7 million, and 99,000 related deaths occur annually (Klevens *et al.*, 2007). HAIs are estimated to account for approximately 10% of hospital admissions and up to 31% in countries with constrained resources (Ministry of Health [MOH], 2010).

A literature review, Mossburg *et al* (2019), indicates that the annual prevalence of occupational exposures among health workers in African states ranges between 31% and 91%. MOH (2016a) shows that there has been steady rise of reported occupational exposures to blood and body fluids within Kenyan health facilities from 286 in the year 2011 to 516 in 2014 as shown in Figure 1.1.

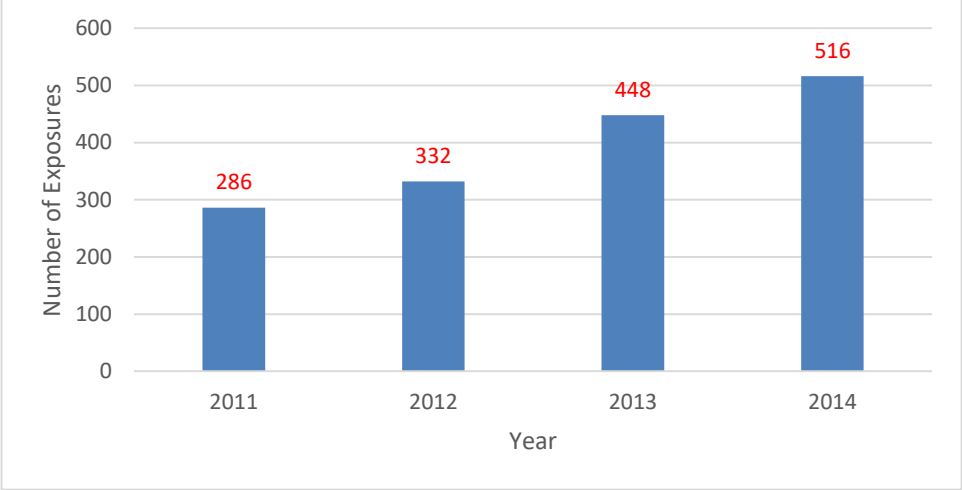


Figure 1. 1: Trend of Occupational Exposures to Blood and Body Fluids (2011 to 2014)
Source: MOH (2016a)

While implementation of OSH Policy is primary in the reduction of OSH problems (Nshunju, 2012), this phenomenon is less common in health care settings than in other sectors (Subhani, 2010). Relevant legislations are made but a majority of institutions do not implement them adequately ((Ndejjo *et al.*, 2015)

1.2 Study Area and Population

The study was conducted in Machakos County which is situated to the South of Eastern region of the Republic of Kenya and East of Nairobi. Counties which share at least a common boundary with Machakos are Embu, Muranga, and Kiambu to the North; Nairobi and Kajiado to the West; Makueni County to the South; and Kitui County to the East, as shown in Figure 1.2. The County covers an area of approximately 6208 Km². (Machakos County Integrated Development Plan [MCIDP], 2015).

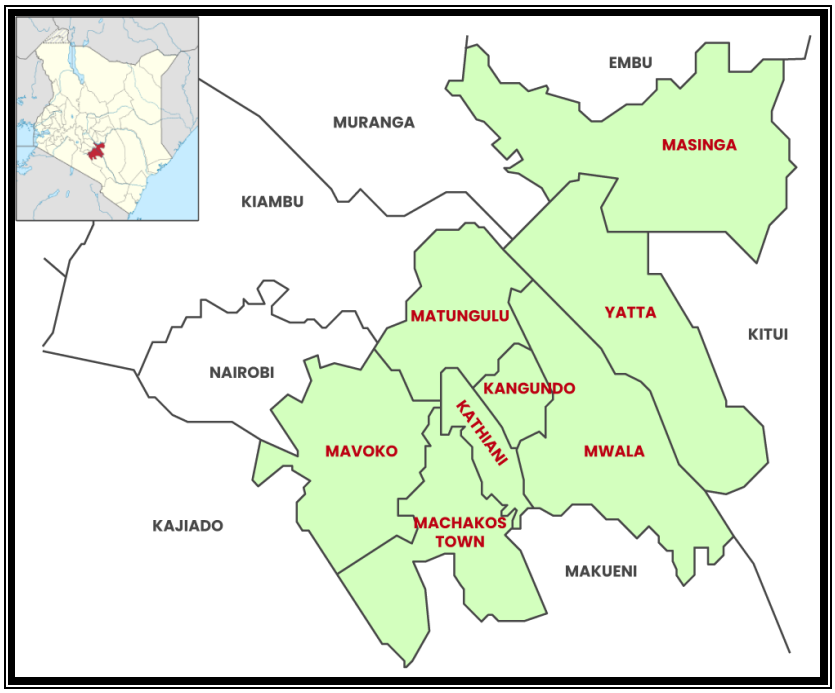


Figure 1. 2: Map of Machakos County
Source: MCIDP (2015)

This study focused on health workers who are in constant and direct contact with patients in the delivery of care in dispensaries and health centres. These are, nurses, clinical officers, and laboratory staff. While doctors have similar interaction with patients as the other aforementioned cadres of health workers, they are not deployed in dispensaries and health centres (MOH, 2014b). They were, therefore, not part of the study population.

At the time of the study, the population of nurses, clinical officers, and laboratory staff in Machakos County was 1649 altogether. Of these health workers 800 were deployed in the dispensaries and health centres while the rest were in hospitals, and management positions (Machakos Health Information System [MHIS], 2017). The county had eight sub-counties with the following distribution of public dispensaries and health centres (Table 1.1).

Table 1.1: Public Dispensaries and Health Centres in Machakos County

Sub-County/Constituency	Dispensaries	Health Centers	Totals
Masinga	20	6	26
Yatta	18	1	19
Kangundo	7	2	9
Matungulu	12	5	17
Kathiani	7	2	9
AthiRiver/Mavoko	5	4	9
Machakos town	20	1	21
Mwala	13	6	19
Totals	**102**	**27**	**129**

Source: MOH (2016b)

1.3 Statement of the Problem

Implementation of OSH practices is less common in health care settings than in other sectors (Subhani, 2010). The Kenya Occupational Safety and Health Act requires organizations to ensure and maintain the highest safety and health standards in their work environments. However, occupational incidents persist in the health sector (KMOH and IntraHealth International, 2013) and the risk of occupational exposures among the healthcare workers is still high (MOH, 2016a).

According to MOH (2016a), 94.7% of documented occupational exposures to blood and body fluids across the Kenyan health facilities, between 2011 and 2014, were rated high risks. This research aimed to establish some of the gaps existing in the work environments and the prevailing safety and health management systems; and publish the findings to serve as a source of knowledge.

1.4 Justification

Healthcare settings post more lost-work-day cases each year, and the probability of employees in healthcare suffering injury is higher than in other sectors. In the year 2011, the incidence of occupational illnesses and injuries in hospitals of the United States (US) was 68 per 1000 regular employees (OSHA, 2013a). Mossburg *et al.* (2019) adduced that the annual prevalence of occupational exposures among health workers in the African countries ranged between 31% and 91%.

Results of the risk assessment conducted in 97 health across Kenya (KMOH and IntraHealth International, 2013) showed that 65.7% of occupational risks in dispensaries and 66.9% in health centres were serious. These findings did not exempt facilities in any County. Machakos County was selected for this survey by picking one piece randomly from tokens with concealed number labels between 1 and 47, the code numbers allocated to all counties in Kenya. Number 16, the code for Machakos County, emerged.

This survey aimed to identify gaps in adequacy of work environments, OSH awareness among the health workers and Management, Management commitment to implement OSH practices, and workers' participation in dispensaries and health centres within the study area. OSH stakeholders will use the findings in developing and implementing appropriate actions for ensuring and maintaining high safety and health status within the health sector. The study will also form a basis for further research.

1.5 Null Hypothesis

Occupational Safety and Health Performance in the public dispensaries and health centres is not affected by OSH awareness among the health workers and the Management, Management commitment, or workers' participation in OSH activities.

1.6 Research Objectives

1.6.1 Main Objective

To determine factors affecting Occupational Safety and Health performance in public dispensaries and health centres within Machakos County, Kenya

1.6.2 Specific Objectives

- To assess the extent to which elements of work environments in the public dispensaries and health centres within Machakos County are compliant with OSH standards
- To determine the extent to which the health workers and Health Management in Machakos County are aware of occupational safety and health
- To establish the extent to which the Health Management within Machakos County is committed to implement Occupational Safety and Health practices in public dispensaries and health centres
- To assess the extent to which health workers in public dispensaries and health centres within Machakos County participate in occupational safety and health activities

1.7 Research Questions

i. To what extent are OSH elements of the work environments in the public dispensaries and health centres within Machakos County compliant with OSH standards?

ii. To what extent are the health workers in public dispensaries and health centres and Health Management in Machakos County aware of occupational safety and health?

iii. To what extent is the Health Management in Machakos County committed to

implement Occupational Safety and Health practices in public dispensaries and health centres?

iv. To what extent do the health workers in public dispensaries and health centres within Machakos County participate in occupational safety and health activities?

1.8 Conceptual Framework

It was conceptualized that the extent of OSH awareness among the health workers and management; Management commitment to implement OSH practices; and workers' participation in OSH activities affect occupational safety and health performance in health facilities. The Kenya Occupational Safety and Health Act (GOK-OSHA, 2007), the Health Sector OSH Policy (MOH, 2014a), and other relevant laws and standards were the intervening variables between the independent and dependent variables. The conceptual relationship among the study variables is outlined in Figure 1.4:

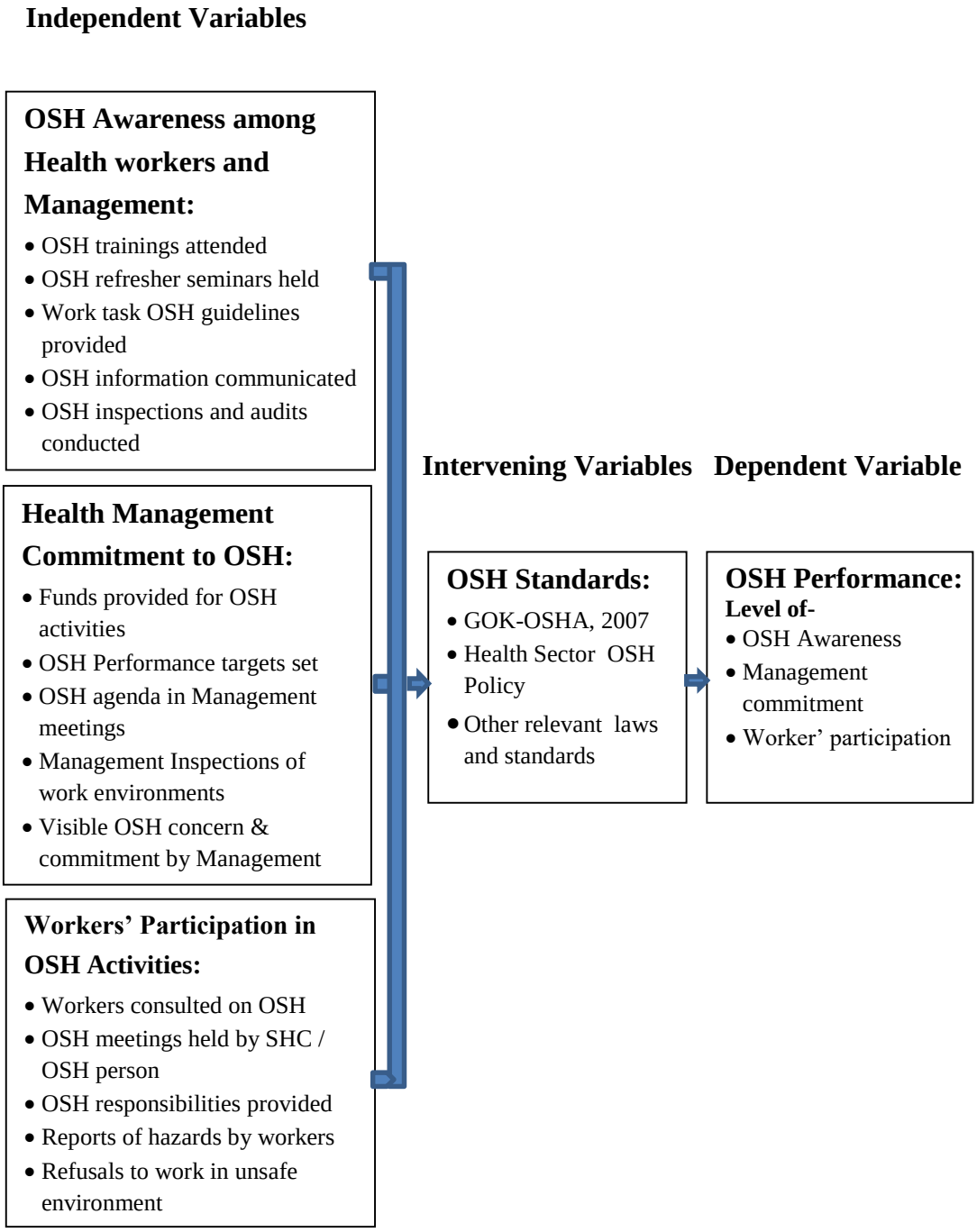


Figure 1. 3: Conceptual Framework

1.9 Scope of the Study

This research focused on assessing the adequacy of various elements of work environments; and determining OSH awareness within the health workers and

Management, Management commitment, and workers' participation in the OSH practices. Only public dispensaries, health centres, and health workers in the sampled facilities within in Machakos County were studied. The survey also included only the Sub-County Health Management Teams who were responsible for the sampled health facilities and all members of the County Health Management Team.

1.10 Ethical Considerations

Permission to conduct the research was obtained from the Institute of Energy and Environmental Technology of Jomo Kenyatta University (Appendix 6). Written clearance was also obtained from the Machakos County Commissioner and the County Director of Health Services before engaging any health facility, health worker, or member of the Health Management for the research (Appendices 7 and 8 respectively).

Informed consent was obtained from each participant before commencing the interview. Participants were explained the importance of the research and assured of their anonymity, and confidentiality of the information given. They were further informed they free choose either to participate or not to participate, and to withdraw from the study at any stage; and they were to suffer no harm at all for their decision.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Principles

2.1.1 Occupational Safety and Health Management System

An occupational safety and health management system (OSHMS) refers to the establishment of strategies for the enhancement of safety and health at work to prevent and control occupational injury and illness (Alberta, 2011). The application of OSHMS mainly centers on availing, in the workplace, a reliable means of performance assessment and improvement in injury and illness avoidance through an active hazards and risks management (ILO, 2011).

This concept of management is founded on the Deming Cycle (PDCA), a management model which illustrates the principle of continual improvement (ILO, 2011). Figure 2.1 illustrates the PDCA Cycle.

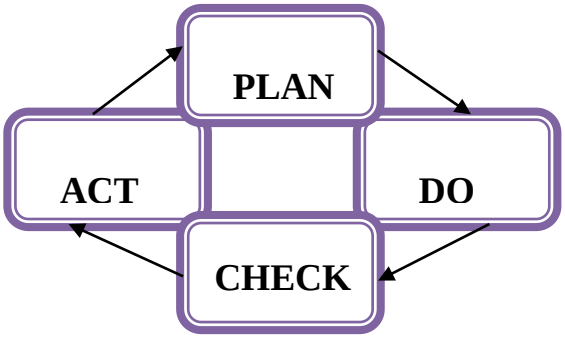


Figure 2. 1: PDCA Cycle

Source: BS: OHSAS 18001 (2007)

With regards to occupational safety and health, "**Plan"** is the initial phase of the cycle when OSH policy is developed, forecasting is done and resources allocated including the provision of skills and responsibilities, hazard identification and risk assessment. "**Do"** refers to putting the OSH programme into operation, while "**Check"** is the evaluation of the strengths and weaknesses in the performance of the programme.

"**Act"** means taking appropriate steps for continual improvement in the subsequent cycle (ILO, 2011).

This iterative process assists the organizations in making, effecting and preserving their OSH policies (BS: OHSAS 18001, 2007). Putting in place an active structure that takes advantage of individual and group contributions to its success demonstrates the soundness of management as regards safety and health in the organization (HSE, 2008; ILO, 2011).

2.1.2 Occupational Safety and Health Awareness

Training is a primary component of OSH management wand aims to guarantee and enhance understanding of occupational safety and health among workers, managers, and supervisors (Michigan Occupational Safety & Health Administration [MIOSHA], 2011). OSH awareness helps persons in the workplace to make their contribution to safety and health from an informed position (EU, 2011). The Management needs to understand the relevant legislation and efficient OSH management while workers should understand work hazards and safe work practices (Health and Safety Executive [HSE], 2008).

Familiarity with work hazards contributes to safer work practices in workplaces (Ndegwa, 2015). According to Alli (2008), OSH awareness makes individuals fit into their work by acquiring the required skills and knowledge and this helps in making appropriate decisions, and in the achievement and sustenance of good working conditions and environments.

The Kenya Occupational Safety and Health Act (GOK-OSHA, 2007) mandates employers to ensure the provision of OSH information and training to all persons in the workplaces. The employer determines the required OSH competences and makes the necessary provision for sustaining knowledge within the organization for all persons to effectively discharge their safety and health duties (ILO-OSH, 2001). The

management must prepare and communicate safety and health instructions and guidelines for the work tasks and monitor their compliance in the workplaces (MOH, 2014a).

According to MIOSHA (2011), written procedures need to be developed for each task providing instructions for safe operation and performance of the task. Written procedures help in providing training to new workers and establishing a sustained scale of performance (WorkSafe BC, 2013). Provision of specialized training in occupational safety and health to health workers and allocation of financial resources for the function should be a priority of health management at all levels (MOH, 2014a).

A good OSH training plan involves an assessment of worker competencies (MIOSHA, 2011). It should include all workers, supervisors and managers; and ensuring trainers are competent (ILO-OSH, 2001). Employers are obligated to allow all workers to participate in OSH training during usual working hours without any economic harm or other barriers. OSH training should be evaluated periodically for its relevance and effectiveness (ILO-OSH, 2001).

Safety and health policy and information must be communicated throughout the health facilities through trainings and displays (MOH, 2014a). Displaying OSH-related information throughout the workplace serves as a continual reminder to everyone in the workplace (Alli, 2008).

The Directorate of Occupational Safety and Health services is designated for the effectiveness of the national OSH system in addressing workers' and employers OSH needs, such as carrying out training and technical inspections. An Occupational Safety and Health Officer should carry out inspections of the workplaces in the area of duty and report (GOK-OSHA, 2007). OSH Audits should be conducted in the work environments at least once annually (GOK-OSHA, 2007; MOH, 2014a). According to HSE (2011), the management should make sure that regular audits are conducted on the effectiveness of safety and health management arrangements and risk controls.

These audits should be conducted by independent competent people to yield maximum benefits and be useful in assessing performance of the OSH management system, and providing impetus for decision making processes and corrective actions (HSE, 2008).

2.1.3 Management Commitment to Implement OSH Practices

Management commitment to occupational safety and health is not optional for the employer (ILO-OSH, 2001). There must be an observable continuous commitment to implementing safety and health measures by establishing goals and objectives and providing adequate resources and support (HSE, 2008). According to MOH (2014a), the provision of the necessary financial resources for OSH activities in the health sector is a must. Once the management plays an active role in OSH, workers appreciate the importance and sustainability of the programme (Alli, 2008).

The management is responsible for implementing actions that promote health, and act as a model which as a result influences corporate culture and actions of employees (EU, 2011). Attitudes and conduct of people in the organization are vital to the success of a safety and health system (HSE, 2013). All levels of management must act as role models to the workers in creating safe and healthy work environments (EU; 2011; MIOSHA, 2011). Participative leadership in health procedures and encouragement of workers' involvement increases acceptance of the occupational safety and health policy by employees (EU-OSHA, 2010).

According to Alberta (2011), the efficiency of leadership is enhanced by the physical presence of top executives in the workplace, observing all safety measures themselves and providing OSH communication and support supervision. Conducting shop-floor checks in the workplace and eliciting individual worker's safety and health concern demonstrates management concern and commitment to safety and health and this encourages workers to participate optimally to the safety and health effort (OSHA, 2013b). According to MIOSHA (2011), management commitment inspires the provision of necessary resources and the control of activities within an organization.

Organizations ought to integrate safety and health into all operations and regard it like any other industrial mission. Including safety and health procedures in total quality management promotes the success of a healthcare facility (EU, 2011 p.33). Organizations must put in place procedures for evaluation of OSH performance indicators (ILO, 2001). According to Health and Safety Authority [HSA] (2017), safety and health performance must be measured against set targets and standards. Self-monitoring is essential for early detection of weak areas and improvements necessary to enhance efficiency of the OSH system.

An active monitoring programme involves a proactive system which includes systematic inspections of work systems, work sites, and close examination of work environments (ILO, 2001). According to WorkSafe BC (2013), regular workplace inspections are useful in the detection and identification of unsafe or unhealthy conditions and situations, determining the appropriate corrective and control measures, and preventing the development or reoccurrence of such unsafe work conditions.

Safety and health should also regularly form an agenda for board meetings (ILO-OSH, 2001). It is in the management meetings that policies and procedures are reviewed; workers' concerns and relevant information and reports considered; and actions for OSH improvement developed (WorkSafe BC, 2013). Reviewing safety and health performance in executive meetings is helpful to the management in establishing whether the necessary principles have been entrenched within the organization and assessing the effectiveness of the system in risk management (HSE, 2011).

The overall responsibility for all aspects of occupational safety and health management should be delegated to a member of the executive board (ILO-OSH, 2001). Putting an OSH manager on the senior management demonstrates the level of importance the organization attaches to safety and health (HSE, 2011). Visible exemplar leadership helps the management in setting and sustaining safety and health performance expectations (Safety Work Australia [SWA], 2011). According to OSHA (2013b),

observable and genuine management leadership is pivotal to the effectiveness of safety and health programmes.

2.1.4 Workers' Participation in OSH Activities

Participation is the physical, mental, and emotional involvement of people in a group situation which drives them to direct their concerted efforts toward the realization of a common objective with shared responsibilities (Newstrom, 2007). Involvement of workers in OSH management within an organization is indispensable (Alberta, 2011). Health managers should involve workers as stakeholders in decision-making processes as regards their safety and health at work (MOH, 2014a).

Every worker has the duty of ensuring safety and health of own self as well as that of other people who are or may be affected by his or her conduct at work. The employee is legally obligated to follow the laid down organizational safety and health procedures. They should also report any hazardous condition or situation in their workplace and avoid the dangerous work area until the condition is abated (GOK-OSHA, 2007). When workers take part in the development of an OSH system, they are more likely to acknowledge and embrace the safety and health programme (EU-OSHA, 2010).

Active safety culture and consultation programme are major ingredients for efficient management of safety and health (HSA, 2006 p.7). Opportunities for sharing opinions allow people to express their views which in turn help in decision-making (SWA, 2011). Employers, workers, and other stakeholders should consult throughout the preparation, execution and, evaluation of policies and systems. Utilization of the knowledge, experience, and thoughts of the staff leads to the identification of most hazards and a better choice of efficient control measures (SWA, 2011).

Employers are required to support the participation of employees at all stages of OSH management scheme and provide the necessary resources (ILO-OSH, 2001). The

employer has the duty ensure the existence of workplace safety and health committee (GOK-OSHA, 2007). The OSH committee is a vital communication link between the employees and management (GOK-OSHA, 2007). Safety and health committee is a good avenue for workers' involvement in the planning and realization of a safety and health management programme (MIOSHA, 2011).

Regular committee meetings with shared minutes provide everyone in the workplace opportunities to advance concerns for consideration (Alberta, 2011). The appointment of a joint safety and health committees facilitates cooperation between the management and workers; which is essential in maintaining a healthy working environment, the establishment and maintenance of a good social climate, and to the achievement of wider objectives (Alli, 2008).

2.2 Legal Framework

2.2.1 ILO Guidelines on OSH Management Systems, 2001

These guidelines have been developed by the ILO in accordance with international principles which have been agreed upon and described by the ILO's tripartite. According to the guidelines, a national Policy, to establish and promote OSHMS in organizations should be formulated, implemented and regularly reviewed by a competent institution nominated for that purpose.

The guidelines make the employer responsible for OSH management and compliance with the national OSH legislation within the organization. The employer should demonstrate commitment and establish an OSH management system in the organization, including OSH policy and continual improvement. These ILO guidelines serve as a practical tool to be used by organizations and the competent authority for continual improvement in OSH performance. Organizations are guided on the integration of OSH in the organizational management arrangement. All members of organization are encouraged to apply the suitable principles of OSH management to sustain improvement in OSH performance. The overall responsibility for all aspects of

occupational safety and health management should be delegated to a member of the executive board.

According to the guidelines, the employer should develop the organization-specific OSH policy in consultation with workers, and ensure it is disseminated and made available to workers at their workplaces. The policy should be reviewed regularly to ensure its continued relevance. The guidelines highlight the importance of worker participation in OSH management system in the organization. They require employers to ensure that they involve, inform, and train on workers on all aspects of OSH; as well as provide necessary resources to facilitate worker participation.

The employer should identify and provide the necessary OSH training to all workers at no charge. The training should be carried out by competent persons, reviewed at regular intervals to maintain relevance and effectiveness, and refresher seminars conducted consistently. Documentation of OSH management system and responsibilities must be maintained within the organization.

2.2.2 The Kenya Constitution, 2010

Occupational Safety and Health is entrenched in the Kenya constitution, 2010 under the bill of rights. According to article 41 of the constitution, every worker has the right to reasonable working conditions and terms of employment. Articles 42 and 43 of this supreme law provides the worker and every person with the right to clean environment and the highest achievable standard of health.

2.2.3 The National Occupational Safety and Health Policy

The main aims of the National OSH policy are to continually develop, implement and sustain National OSH systems, and to ensure that people who suffer work-related injuries or disease are compensated fairly. It recognizes safety and health in the work environment as a basic human right that goes with the right of workers to be protected from existing and emerging risks in their work environments. The policy is guided by

the existing OSH legislation and all the relevant international standards. The principles guiding the policy are mainly the OSH Act; Work Injuries and Benefits Act; the ILO conventions, codes of practice and guidelines on OSH; and the ILO and WHO Action Plans.

The policy underscores the commitment of the government to establish safety and health committees in workplaces. This is aimed at enhancing corporation among employers and workers in occupational safety and health matters. According to the Policy, the government is further committed to increasing OSH awareness and education through involving other stakeholders to mainstream OSH in teaching curricula and encouraging specialized OSH training.

The policy binds employers to establish safety and health committees and sustain OSH familiarity within their organizations through training and the provision of relevant information in their workplaces. The employers should also report all dangerous OSH occurrences in their workplaces to the Director of Occupational Safety and Health services. Workers must follow OSH requirements and guidelines in their workplaces, report hazardous situations, and participate in safety and health committee meetings in their workplaces.

2.2.4 The Kenya Occupational Safety and Health Act, 2007

This Act (GOK-OSHA, 2007) applies to all workplaces where a person works regardless of his or her terms of engagement. The purpose of this piece of legislation is to secure the safety, health, and welfare of all workers. It also provides for protection of other people against risks attributable to workers and their activities.

The Act requires all employers to guarantee safe and healthy work environments for all employees. Every workplace must be of adequate size and not overcrowded during work processes. There should be ample free space for the tasks and at least ten cubic meters of air volume for each worker. While a workplace is required to have not less

than three meters ceiling height, any height above four and a half meters from the floor level is disregarded while determining the air volume in the workplace. Efficient and adequate means of ventilation in all workrooms must be provided.

According to the Act, all work areas and passages must continually have adequate, efficient, and a suitable source of lighting. Any glazed windows and skylights must always be clean and not obstructed. Storage of materials should be such that they are stable and not likely to fall or collapse; while at the same time not obstructing natural lighting, ventilation, passageways, and gangways among others. Floors in wet work areas should have efficient drainage to keep them dry. The management must ensure ergonomics and safe access within the workplace.

The employer is obligated to provide the relevant information and training to all persons in the workplace. He must prepare safety and health policy and communicate it throughout the workplace and facilitate the formation of safety and health committee. The Factories and Other Places of Work Act (Safety and Health Committees) Rules, 2004 are adopted in the application of GOK-OSHA, 2007. The rules require representation of workers in the safety and health committee by half the number of the members thereof. The various functions of the committee provided by these rules aim at the promotion of safe and healthy work environments and creating effective communication links between the management and workers. Normally, each of the committees should meet at least four times a year with at most three months between meetings. Minutes of committee meetings should be maintained.

The Act spells out the duties of employees concerning to safety and health in the workplace. According to Act, workers should among other duties ensure their actions are safe to themselves and other persons and comply with safety and health procedures set by the employer. They should co-operate with the employer in OSH compliance and report hazardous situations and accidents which occur in the workplace.

2.2.5 Safety and Health Policy

The organization's top administration determines the success of safety and health management (HSE, 2011). Active OSH management begins with developing the organization's Health and Safety Policy which encompasses safety and health vision of the organization (HSE, 2008). The safety and health policy forms a major element of the organization's culture, values, and performance standards (HSE, 2011). It is a declaration of OSH dedication accepted and embraced by the management as well as the employees (MIOSHA, 2011).

Employees should take part in the preparation of the OSH policy, and a senior executive must sign and date the document as a commitment (ILO-OSH, 2001) to support its life and continuous improvement of safety and health (HSA, 2006 p.15). Every person in the workplace must be familiarized with the policy by communicating it throughout the workplace (ILO-OSH, 2001; GOK-OSHA, 2007).

The Kenya health sector OSH policy (MOH, 2014a) is founded on the Occupational Safety and Health Act (GOK-OSHA), 2007. It declares the commitment of the Ministry of Health to the maintenance of safe and healthy work environment and the provision of necessary resources and support for OSH. The policy enumerates the responsibilities of health managers at different levels, workers, contractors, and visitors in the implementation of OSH actions within the health facilities.

The guidelines emphasize the critical need for the management to provide the financial resources for OSH and integrate it in planning and decision-making processes for all levels. The policy requires the provision of specialized OSH training to all health workers; and that it should be disseminated in all health facilities through public displays and training sessions.

The Health Management is mandated by the policy to consult with health workers or their Safety and Health representatives regarding their safety and health. There must

an OSH coordinator at the County and Sub-County levels and an OSH committee or focal person at the facility level based on population of workers. Facilities with twenty and more workers should have an OSH committee while an OSH focal person suffices where workers are less than twenty.

2.3 Previous Relevant Studies

A study conducted in Malaysia (Surienty, 2012) held that management commitment and external support affected OSH implementation in Small Enterprises. Sawe (2013) observed that management and worker commitment, and involvement of workers in OSH decision making were indispensable elements of occupational safety and health implementation in Mumias Sugar Company. Another study in the Sugar Company, (Okumu, 2016) held that OSH awareness must be sustained since productivity of workers increases when they are trained in occupational health and safety practices.

A study in Kenyan supermarkets (Kaaria, 2015) concluded that management leadership, training, and employee participation affected OSH implementation. A review of literature done in Ghana (Zakari *et al.*, 2016) identified inadequate legal mandate as a reason for weak OSH compliance in Ghana. Research carried out in Thika Level 5 Hospital (Wambilianga and Waiganjo, 2015) claimed that communication and training affected compliance with OSH regulations. McGonagle *et al.* (2016) showed the significance of teamwork and management commitment in OSH activities.

Ndegwa (2015) found that the manufacturing sector had challenges in OSH performance and attributed the situation to lack of employee cooperation, inability to comprehend OSH legislation, as well as lack of management commitment. Maseko (2016) asserted that training of workers in safety and health is fundamental in the safety and health management and ensures competence and safe conduct, among workers in the discharge of their duties, which results in a firm culture of prevention. Oluoch *et al.* (2017) concluded that occupational safety and health awareness affected workers' consciousness of their work environment within the water sector.

Ndejjo *et al.* (2015) concluded that the persistence of exposure to occupational hazards among health workers in Kampala, Uganda was due to lack of appropriate protective equipment and over-working. Report of risk assessment (KMOH and IntraHealth International, 2013) conducted on Kenyan public health facilities in 2011/2012 attributed the serious occupational safety and health risk level and severe non-compliance to lack of OHS policy and a designated resource person. Nevertheless, even with availability of a health sector OSH policy (MOH, 2014a), the risk occupational exposures remains high as shown in MOH (2016a).

Tait *et al.* (2018) found that lack of personal protective equipment was a major cause of occupational exposure among health workers, and concluded that training on OSH had great positive impact on good OSH practices. The research was, however, limited to only laboratory workers in Kajiado County. According to Gbadago, (2017), implementation of OHS measures in Tongu hospital reduced stress, injuries and illnesses; and increased staff morale and productivity.

2.4 Knowledge Gaps

Not much research has been published to appraise the adequacy of the various elements of health facility work environments; or to elucidate the effects of Management commitment, OSH awareness among health workers and Management, and workers participation on OSH performance in public dispensaries and health centres. This situation has resulted in knowledge gaps which this research attempted to fill using Machakos County, Kenya.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Research Design

The study was a cross-sectional survey involving the public dispensaries and health centres, health workers in the facilities, and the Health Management within Machakos County. A cross sectional study facilitates collection of data on various aspects of a population at one point in time (Kothari, 2004). The materials, data collection tools, and methods were specific for each of the study objectives as described in Section 3.4.

3.2 Sampling Methods

Stratified and simple random methods were applied in the survey. Stratifying the health facilities was done to ensure that the sample size was distributed between dispensaries and health centres proportionately. Health workers were also stratified to ensure proportional distribution of the sample among them based on their population per category. The dispensaries and health centres in Machakos are shown in Table 3.1 (MOH, 2016b).

Table 3. 1: Distribution of Health Facilities by Category

Category	Number
Dispensaries	102
Health Centres	27
Total	**129**

The distribution of the targeted health workers in the dispensaries and health centres within the study area is shown in Table 3.2 (MHIS, 2017).

Table 3. 2: Distribution of Health Workers by Category

Category	Total Population
Nurses	658
Clinical Officers	80
laboratory Staff	62
Total	**800**

The computed proportions of sample size for each category of health facilities and health workers were selected randomly from their respective strata.

3.3 Sample Size Determination

a) To determine the sample size for health facilities, *Naissuma* (2000) formula was applied:

$$n = Nc^2 / [c^2 + (N-1)\, e^2]$$

Where:

n = Sample size

N = Population

c = Coefficient of Variation (CV)

e = Standard error

According to *Naissuma,* a coefficient of variation of between 21% < e < 30 % is acceptable in most surveys. Considering that health facilities are usually wide spread over expansive geographical areas, a coefficient of 25% (0.25) was used to get a moderate sample size and minimize research time and transport cost. A standard error of 5% (0.05) was used. The total number of targeted health facilities (N) were 129 (MOH, 2016b) as shown in Table 3.1.

Therefore:

$n = Nc^2 / [c^2 + (N-1)\, e^2]$

$n = 129 \times 0.25^2 / [0.25^2 + (129 - 1)0.05^2]$

$n = 8.0625 / 0.3825$

$n = 21.08$

$n = 21$

The sample was distributed to the facilities based on their number in each category using the formula:

$$n_1 = Xn / N$$

Where: n_1 = Number of facilities per category

n = Desired sample size in the study area

X = Number facilities in the category.

N = Total number of targeted facilities in the study area.

The random sample comprised of 5 health centres and 16 dispensaries in 6 sub-counties as shown in Table 3.3.

Table 3. 3: Sampled Health Centres and Dispensaries

Health centres	Dispensaries	Sub-County
Wamunyu	Kavumbu Mumbuni Masundi	Mwala
Muumandu Mutituni	Kimutwa Kiitini	Machakos
Nguluni	Mbuni Donyo Sabuk Kikuyuni	Matungulu
-	Kikule Milaani Ndela Kikumini	Masinga
-	Kithimani Kyasioni Kwa Mwata	Yatta
Athi River	Mlolongo	Mavoko

b) To have a comprehensive assessment of the work environments, purposive sampling method was applied to determine the number of workrooms to be assessed. Workrooms in which health workers spent most of their working time each working day were identified. These were the consultation, injection/dressing, laboratory, and Mother and Child Health (MCH) rooms. At least three (3) rooms were targeted for assessment in each health facility depending on the facility size; which included one or two consultation rooms, one injection/dressing room, a

laboratory, and MCH room. Of all the 182 workrooms in the sampled facilities, a total of 80 (44%) were assessed.

c) *Naissuma* (2000) formula was utilized in determining sample size for the health workers.

$$n = Nc^2 / [c^2 + (N-1)\, e^2]$$

A coefficient of variation of 30% (0.3) was used to ensure that sample size was as big and representative as possible. A standard error of 3% (0.03) was adopted to minimize the degree of error. The total number of targeted health workers in the dispensaries and health centres within Machakos County (N) was 800 (Table 3.2).

Therefore, applied:

$$n = Nc^2 / [c^2 + (N-1)\, e^2)]$$

$$n = 800 \times 0.3^2 / [0.3^2 + (800 - 1)0.03^2]$$

$$n = 72 / 0.8091$$

$$n = 89.$$

The sample size was purposively increased by 20% to 107 to safeguard the representativeness of results against the effect of non-response. This sample was approximately 13% of the study population and consistent with Mugenda and Mugenda (2003). According to Mugenda and Mugenda, 10% of the study population is a sufficient sample size in a survey.

The sample was distributed to the health workers based on their number in each category using the formula:

$$n_1 = Xn / N$$

Where: n_1 = Number of health workers per category

n = Desired sample size in the study area

X = Number health workers in the category.

N = Total number of the health workers in the study area.

The distribution of health workers in the sample according to their categories was as shown in Table 3.4.

Table 3. 4: Sample Size Distribution of Health Workers by category

Category	Number
Nurses	88
Clinical Officers	11
laboratory Staff	8
Total	**107**

The sample size was distributed in the sampled health facilities as shown in Table 3.5.

Table 3. 5: Health Workers Interviewed in the Sampled Health Facilities

Facility Name	Nurses	Clinical Officers	Lab Staff	Totals
1. Wamunyu Health Centre	7	2	1	**10**
2. Kavumbu Dispensary	3	0	0	**3**
3. Mumbuni Dispensary	4	1	0	**5**
4. Masundi Dispensary	2	0	0	**2**
5. Muumandu Health Centre	9	1	1	**11**
6. Mutituni Health Centre	9	2	1	**12**
7. Kimutwa Dispensary	4	1	0	**6**
8. Kiitini Dispensary	2	0	0	**2**
9. Nguluni Health Centre	7	1	1	**9**
10. Mbuni Dispensary	3	0	1	**4**
11. Donyo Sabuk Disp.	3	0	0	**3**
12. Kikuyuni Dispensary	2	0	0	**2**
13. Kikule Dispensary	3	0	0	**3**
14. Milaani Dispensary	2	0	0	**2**
15. Ndela Dispensary	4	1	1	**6**
16. Kikumini Dispensary	2	0	0	**2**
17. Kithimani Dispensary	3	1	0	**4**
18. Kyasioni Dispensary	3	0	0	**3**
19. Kwa Mwata Dispensary	3	0	0	**3**
20. Athi River Health Centre	9	1	2	**12**
21. Mlolongo Dispensary	4	1	0	**5**
Totals	**88**	**11**	**8**	**107**

3.4 Research Instruments and Methods

3.4.1 Assessing Adequacy of Work Environments

In order to assess the adequacy of the various components of work environments, a measuring tape was used to take linear measurements and a protractor to determine the full-opening angles of windows. Checklists and photography were used to record observations within the workrooms such as seating arrangements, material storage, signage and patient examination couches. The workroom linear measurements were used to compute floor areas, air volumes, and total window surface areas in the respective workrooms. The total volume of any fixed cabinet(s) in a workroom was subtracted from the computed room volume. The number of seats which were found arranged in each workroom were used to determine the usual number of workers in the room. The air volume per worker was, therefore, determined using the formula: ***[(Floor area x Ceiling Height) – Volume of Fixed Cabinets] / Number of workers.***

Widths of doors and passages were measured while material storage and lifting schemes were physically assessed. Patient examination couches were also assessed. All the data collected were summarized, presented in tables, and analyzed. The results of each measured / assessed OSH element were compared with the relevant requirement in GOK-OSHA, to determine adequacy of the component. Other existing standards were consulted in situations where GOK-OSHA failed to provide measurable standards.

3.4.2 Assessing Occupational Safety and Health Awareness

So as to determine the level of OSH awareness within the health workforce and Management, questionnaires with *Likert*-scaled questions in the form of positive statements were used to collect data from respondents. Each category of participants was interviewed using a different set of questionnaire. The respondents were asked to indicate their level of agreement with each of the listed statements using the scale of

(5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree). Each statement represented an OSH awareness practice.

Further, the informants were requested to indicate the number of times each of the practices had been effected using the scoreboard of (5-at least four, 4-three, 3-two, 2-one, 1-zero) provided, and answering other structured questions. Observation checklists and photography were used to record observations in the facilities. All the data collected were summarized, presented in tables, and analyzed. To obtain aggregate means combined and a single standard deviations for OSH awareness among both the health workers and the Health Management, the average of mean scores of each item in the variable were computed first.

3.4.3 Determining Management Commitment

To assess the extent to which the Management was committed to implement OSH measures, questionnaires with *Likert*-scaled questions in the form of positive statements were used to collect data from health workers. The research participants were asked to indicate their level of agreement with each of the listed statements using the scale of (5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree). Each statement represented a Management commitment practice.

The respondents were in addition requested to indicate the number of times each of the practices had been effected using the scoreboard of (5-at least four, 4-three, 3-two, 2-one, 1-zero) provided. Checklists were used to record observations such as document reviews in the facilities. All the data collected were summarized, presented in tables, and analyzed.

3.4.4 Assessing Worker's Participation

In order to assess the extent of workers' participation in OSH activities, questionnaires with *Likert*-scaled questions in the form of positive statements were used to collect data from health workers. The research informants were asked to indicate their level

of agreement with each of the listed statements using the scale of (5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree). Each statement represented a workers' participation OSH practice.

The respondents were also requested to indicate the number of times each of the practices had been effected using the scoreboard of (5-at least four, 4-three, 3-two, 2-one, 1-zero) provided. Checklists were used to record observations such as document reviews in the facilities. All the data collected were summarized, presented in tables, and analyzed.

3.5 Data Processing and Analysis

The data collected were cleaned, coded, ordered, tabulated, and analyzed. Statistical Package for Social Sciences (SPSS) was utilized in the analysis and presentation of the data in the form of descriptive and inferential statistics. Arithmetic means, standard deviations, and relative frequencies were the main statistics computed. In the absence of outliers in a data set, arithmetic mean is comparatively a stable measure of central tendency and more preferable to other averages (Kothari, 2004 p.132). The standard deviation is a satisfactory universal measure of dispersion (Kothari, 2004 p.135). Analyzed data was presented in tables and charts.

3.6 Data Validation

In order to safeguard data quality, various steps were taken. Before the actual data collection; the questionnaires were pre-tested through a pilot study conducted in Nyeri County during the month of December, 2017. The pre-test involved a sample of 25 health workers and 12 members of the health management. It was ensured that the sample characteristics and the conditions of the study were similar to those planned for the actual study. According to Zikmund & Babin (2001), a pilot survey is necessary before the actual exercise of data collection, when using questionnaires.

The questionnaires were then reviewed and revised before they were used in the actual research data collection. The questions in the research instruments were stated as simply and clearly as possible to ensure all the respondents understood them well. Making sure that the respondents understood the questions properly aimed to help in getting the most plausible information from them.

The quality of the data collected was further enhanced by guaranteeing the reliability of the research questionnaires. Reliability is the measure of the extent to which data collection instruments yield consistent results (Saunders *et al*., 2009). This consistency was assessed by computing *Cronbach's alpha* utilizing the results of the pilot study; which was used to test the reliability of the questionnaires. *Cronbach's* formula was used:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where:

N = the number of items,

C-bar = the average inter-item covariance among the items and

V-bar = the average variance

This coefficient of reliability ranges between 0 and 1, and assesses how the various items in the same instrument correlate among themselves (Orodho, 2009). The reliability coefficients in Table 3.5 were obtained for the constructs.

Table 3. 6: Computed Cronbach's Coefficient for Constructs

Constructs	**Cronbach's Alpha**
1. OSH Performance	0.74
2. OSH awareness among health workers and Management	0.73
3. Health Management commitment to implement OSH practices	0.76
4. Health workers' participation in OSH activities	0.71

A *Cronbach's* coefficient of at least 0.7 indicates satisfactory consistency (Rousson *et al.*, 2002). The questionnaires, therefore, met the acceptable level of reliability for all the variables. Both singly and collectively, the items in the research instruments were found to represent what they were intended to measure. The empirical measures of the variables being tested were found to represent the variables.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The study was conducted in the months of January and February, 2018 and involved twenty-one (21) health facilities comprising of sixteen (16) dispensaries and five (5) health centres in Machakos County. Adequacy of various components of the work environments was assessed in all the 21 sampled facilities. The data were collected from the health facilities, health workers and members of the Health Management based on the specific objectives. The results are presented, analyzed, and discussed in this chapter.

4.1 Response Rate

The response rate among the health workers is presented in Table 4.1.

Table 4. 1: Response Rate

Category	No. Targeted	Response Rate
Nurses	88	84.1%
Clinical Officers	11	81.8%
Laboratory Staff	8	87.5%
Aggregate	**107**	**84.1%**

Out of the one hundred and seven (107) health workers, 93 returned completed questionnaires. Two of the questionnaires were rejected due to response errors while one was rejected due to partial non-response. The number of plausible responses was, therefore, 90 translating to a response rate of more than 84% (Table 4.1).

Thirty-two (32) out of the forty-two (42) members of the health management returned completed questionnaires, a response rate of 76%. According to Mugenda and Mugenda (2003), a response rate of at least 70% is excellent in a survey. The response rates among the workers and management were, therefore, acceptable.

4.2 Demographic Information

Respondents were requested to provide some demographic information during the study.

4.2.1 Designation of Health Workers

The designation of each of the respondents was established in their respective health facilities as shown in Table 4.2.

Table 4. 2: Designation of Respondents

Designations	Number	Percentage
Nurses	74	82%
Clinical Officers	9	10%
laboratory Staff	7	8%
Total	**90**	**100%**

The respondents comprised of nurses (82%), clinical officers (10%), and laboratory staff (8%).

4.2.2 Proportion of Health Workers by Gender

The gender distribution of health workers who participated in the study is shown in Table 4.3.

Table 4. 3: Health Workers' Proportion by Gender

Respondent's Gender	Proportion
Male	26%
Female	74%
Total	**100%**

From Table 4.3., 74% of the respondents were females while 26% were males. It was deduced that about 75% of health workers in Machakos County public health facilities were females. These results concurred with Wakaba *et al.* (2014) who found that 76% of nurses in Kenya to be female. These findings indicated that the proportion of workers in the health sector who may be exposed to occupational health hazards is likely to be higher in the female than male.

4.2.3 Age Distribution among Respondents

The age of respondents at the health facility level was clustered into four classes with class interval of ten years per class. The results in Figure 4.1 showed that the ages of health workers ranged from twenty-one to sixty years. Amongst the respondents, 46% of them were between the age of 21 to 30 years while 39% were in the age bracket of 31 to 40 years and 15% of them were above the age of forty (40) years. Referring to the Kenya National Youth Policy (2006), nearly 85% of the health workers in the facilities were in the youth bracket.

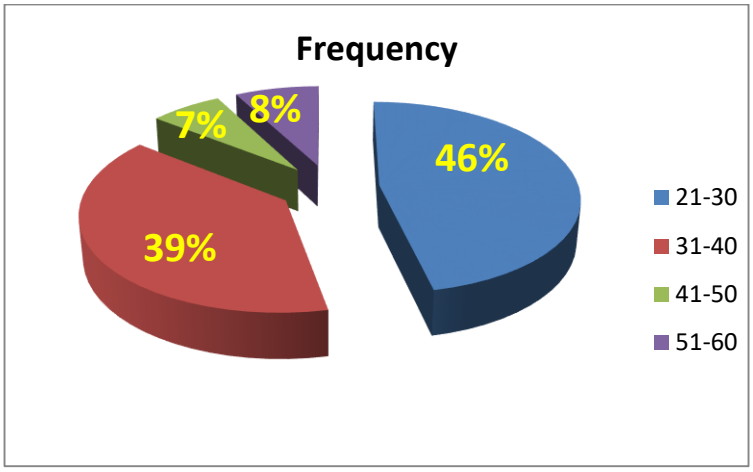


Figure 4. 1: Age Distribution among Health Workers in Years

Table 4. 4: Age Distribution among the Health Management

Age of Respondents	Percentage of Respon
31-40 Years	41%
41-50 Years	47%
51-60 Years	12%
Total	**100%**

This state of affairs was slightly different from that in the Health Management where 41% of the respondents were between the age of thirty-one and forty years, and 47% of them were between the age of 41 and 50 years. Those in the age group of 51 to 60 years were 12%, and no respondent was less than 31 years old (Table 4.4). This showed that most of the health managers were in the middle age bracket.

These results indicated that risk of occupational exposures and injuries was likely to be higher among health workers than in the Health Management. According to ILO (2018), the rates of occupational injuries are much higher among the young than in adult workers. MOH (2016a) shows that among the 1,665 exposed health workers between the year 2011 and 2014, the highest exposure rate, 37.1%, was in those workers aged 25 years and below.

4.2.4 Highest Professional Qualifications among the Research Participants

The respondents were requested to indicate their highest level of their professional qualifications. As shown in Figure 4.2, 67% of the health workers indicated they held diplomas in their respective fields of work, and 12% had Bachelor's Degrees. Those who held certificates were 21%, and none of them had a Master's Degree.

The results indicated that the health facilities had sufficient knowledge base for service delivery at the dispensary and health center levels. That situation demonstrated that the respondents were competent enough to understand and provide the research information required.

The highest professional qualifications among the members of health management are as shown in Figure 4.2.

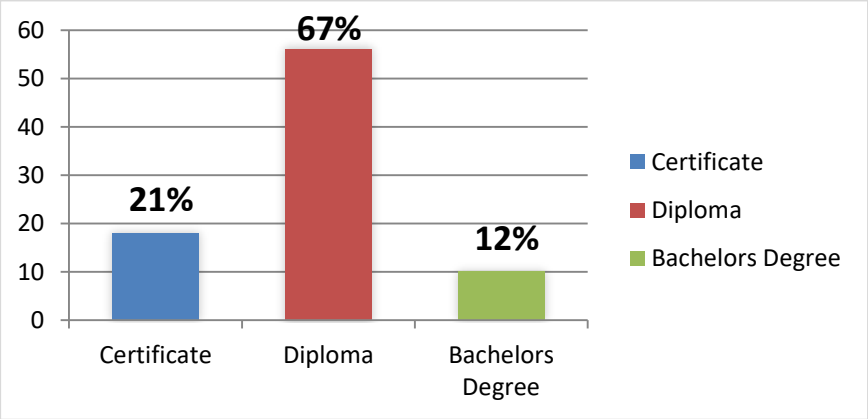


Figure 4. 2: Health Workers' Highest Professional Qualifications

The results in Figure 4.3 revealed an upward shift in the professional qualifications among members of the health management compared to the health workers. All members of the executive had at least a diploma in their respective fields. Approximately 68.8% of the respondents had Bachelor's Degrees, 28.1% Diplomas, 3.1% had a Master's Degree, and none of them had a PhD. These findings showed that there was a higher professional capacity within the health management compared to the health workers. The respondents had enough capacity to understand occupational safety and health, and to furnish the requisite information the study sought to obtain.

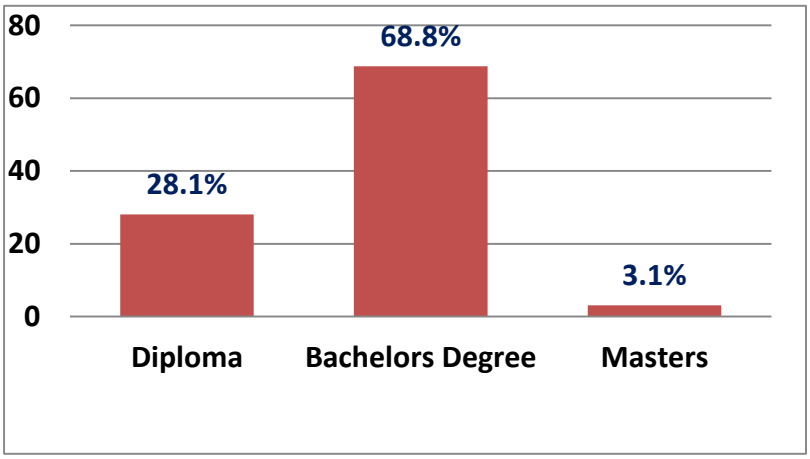


Figure 4. 3: Professional Qualifications within Health Management

4.2.5 Duration in the Current Facility

As shown in Figure 4.4, 40% (n=36) of the respondents stated that they had worked in their respective facilities for one to three years while 26.7% indicated three to five years. About 18.9% of the respondents indicated more than five years while 14.4% were at least six months old in the facility. These results showed that the respondents had been in the facility long enough to have and give reliable information.

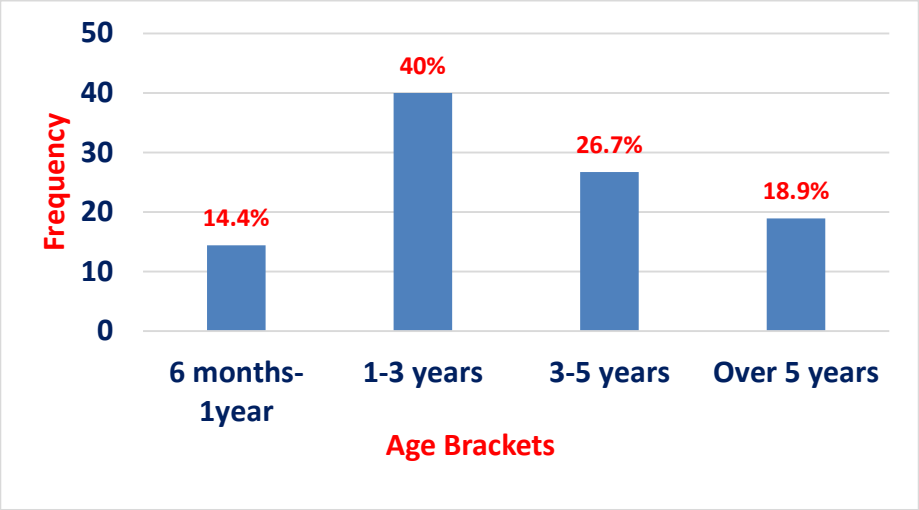


Figure 4. 4: Length of Time Worked in the Facility

4.2.6 Duration in Health Management Position

Results in Table 4.5 show length of time respondents had been in the Health Management positions.

Table 4. 5: Duration in the Health Management

Length of time	Proportion of Respondents
1-3 Years	41%
3-5 Years	34%
Over 5 Years	25%
Total	**100%**

The results in Table 4-5 showed that 41% of the respondents had been in the Health Management positions for one to three years, 34% for three to five years, and 25% of them for more than five years. These results indicated that all the respondents at this level had sufficient experience in their positions and competent to understand and provide information sought by the study.

4.3 Adequacy of Work Environments

The results of assessments and data computed on various aspects of work environment within the health facilities are presented in Table 4.6. They summarize the detailed data in APPENDICES 4 and 5.

Table 4. 6: Adequacy of the Work Environments

Environmental Element	Number Assessed	Percentage Compliant
1. The facility Building Plan available	21	23.8%
2. The Building Plan approved by DOSHS	5	0%
3. Height of Workroom ≥ 3m	80	21%
4. Air volume of workroom ≥ $10m^3$ per worker	80	47.5%
5. Width of full-open door ≥ 900mm	80	48.8%
6. Door shutters swing outward	80	40.0%
7. Door not lockable from inside	80	42.5%
8. Surface Area of window ≥ 10% of the room floor area	80	81.3%
9. Open-able Surface Area of window ≥ 6.25% of the room floor area	80	84.4%
10. Window shutter full opening angle = 180^o	96	35.4%
11. 'Through' Natural Ventilation in the Workroom	80	38.5%
12. Width of Passageway ≥ 1.2m	21	42.9%
13. Passageway not obstructed	21	38.1%
14. Emergency Exit door provided	21	57.1%
15. Width of Emergency Exit door ≥ 900mm	12	30.0%
16. Marked Fire Assembly point	21	81.0%
17. Materials storage shelves stable	18	72.2%
18. Materials storage shelves not obstructing windows	18	44.4%
19. Materials storage shelves with equipment to reach heights	18	22.2%
20. Patient Examination Couch With adjustable height	27	0%
Aggregate Mean of adequacy		**42.5%**

4.3.1 Health Facility Building Approval

From results in Table 4.6, 23.8% of all the health facilities assessed maintained a building plan of the existing building(s). None of the Plans was approved by the Directorate of Occupational Safety and Health Services (DOSHS). According to

GOK-OSHA (2007), all new building and building alteration plans for workplaces must be approved by the Director of Occupational Safety and Health Services. The findings showed that all the facilities were not compliant with law in relation to approval of buildings.

4.3.2 Heights of Workrooms

The results in Table 4.6 showed that approximately 79% of the eighty (80) workrooms assessed had lower ceiling heights than the minimum three meters (3m) specified in the Kenya OSH Act. Based on the results, the work environments in these workrooms were not compliant and, therefore, not permissible.

4.3.3 Air, Ventilation, and Lighting

As shown in the results, an air volume of less than $10m^3$ per worker was revealed in 52.5% of the workrooms. The OSH Act requires every workroom to have an air volume of at least $10m^3$ per worker. The GOK-OSHA requires effective and adequate natural ventilation in the workrooms. Approximately 61.5% of the workrooms did not have *through* ventilation. While the Act fails to provide specifications for effectiveness and adequacy of ventilation, the National Planning and Building Authority regulations [NPBA], 2009 demand *through* ventilation in all workrooms.

About 55.6% of storage shelves were obstructing windows. The OSH Act provides that materials should be stored such that they do not obstruct windows. Almost 15.6% of the workrooms did not achieve the minimum total window opening areas of 6.25% of the room floor area stipulated in NPBA (2009). Based on these results natural ventilation was not adequate.

The total window surface areas for 18.7% of the workrooms were less than 10% of the respective room floor area. The GOK-OSHA requires all workrooms to have adequate natural lighting. While Act does not specify the minimum permissible natural lighting, NPBA (2009) provides that the total window surface area in a workroom should be at

least 10% of the room floor area. The results showed that these rooms did not have sufficient natural lighting.

4.3.4 Risk from Open Windows

From results in Table 4.6, 64.6% of the window shutters fully opened to less than 180^o, making them project to passages when open. These projecting window shutters had high potential of being hit by people passing by them. The GOK-OSHA (2007) requires a window not to be a source of risk to people. Although the Act does not explain further on this requirement, the HSA regulations (2007) stipulate that a window should not project to areas where people pass. This requirement implies that a window shutters should either be sliding or be constructed such that the full opening angle is 180^o so that it lies flat on the wall behind when open. Based on the results the researcher deduced that the windows provided deplorable work environments.

4.3.5 Manual Handling

The results in Table 4.6, show that all the twenty-seven (27) patient examination couches assessed had no mechanism to adjust heights. ILO (2012) requires work surfaces to be such that they allow all workers use them at or below their elbow heights. The examination couches exposed health workers to handling patients at unsafe heights.

Among the material storage shelves, 27.8% were not stable therefore, had the risk of collapsing on workers. These shelves contravened GOK-OSHA (2007) which provides that storage of materials should be such that they cannot collapse. About 77.8% of the shelves were not provided with equipment to reach materials in heights. According to ILO (2012), materials to be lifted must be kept at shoulder level and workers should not be exposed to lifting, carrying or reaching materials above shoulder level. These results demonstrated that health workers were exposed to unacceptable patient and material handling conditions in the work environments.

4.3.6 Workplace Access and Emergency Exit

The results in Table 4.6 show that 60% of the doors were swinging inwardly while 57.5% had widths of less than 900mm. Among the doors, 57.5% were locked from inside. The GOK-OSHA (2007) requires each workroom to have adequate means of ingress and exit. The Act further provides that door shutters should swing outward and not to be lockable from inside. While the Act fails to specify minimum acceptable sizes of doors, NPBA (2009) provides that each workroom door should have a minimum opening width of 900mm. Based on the results, these doors did not provide sufficient ingress and exit to the workrooms.

While none of the workrooms had the stipulated individual emergency exit door (GOK-OSHA, 2007), 57.1% of the health facilities had emergency exits from their passageways. Among the exits, 67% were less than 900mm wide contrary to GOK-OSHA (2007). Of all the passageways, 57.1% were less than 1.2m wide and 61.9% of them were obstructed. GOK-OSHA (2007) stipulates that passageways must be of adequate width and unobstructed. While the Act does not provide standard widths of passageways, NPBA (2009) specifies the minimum width of passages in buildings where people work to be at least 1.2m. The results showed that emergency exits in the health facility workplaces were not compliant with the existing standards.

4.4 OSH Awareness within the Health Workforce and Management

Results of agreement among health workers on their OSH awareness are presented in Table 4.7.

Table 4. 7: OSH Awareness among Health Workers

Practices	5	4	3	2	1	Mean	SD
1. You have received a training specifically on occupational safety and health	5	11	20	30	24	2.37	0.753
2. Regular refresher seminars on Occupational Safety and Health are conducted in the facility	6	10	21	30	23	2.40	0.756
3. There are safety and health guidelines for all the various work tasks in the facility	6	11	22	29	22	2.44	0.751
4. Safety and health information is adequately communicated throughout the facility	4	12	24	29	21	2.43	0.738
5. You know your workplace hazards well	7	9	20	32	22	2.41	0.744
Aggregate						**2.41**	**0.748**

(5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree)

The results in Table 4.8 shows the performance of OSH Awareness practices within the health workforce.

Table 4. 8: Performance of Workers' OSH Awareness

Indicators of Performance	5	4	3	2	1	Mean	SD
1. OSH Trainings attended	0	4	7	36	43	1.69	0.685
2. OSH seminars attended in the health facility	0	2	6	37	45	1.61	0.559
3. Work task safety and health guidelines provided	1	7	15	31	36	1.96	0.706
4. OSH information communicated	0	7	13	25	45	1.80	0.716
5. Workplace hazards known well	4	9	24	36	17	2.41	0.671
Aggregate						**1.89**	**0.667**

Scoreboard

Frequency of implementation (Number)	≥4	3	2	1	0
Scale	**5**	**4**	**3**	**2**	**1**

The results in Table 4.9 show the agreement among members of Health Management on their OSH awareness.

Table 4. 9: OSH Awareness within the Health Management

Practices	5	4	3	2	1	Mean	SD
1. You have received a training specifically on OSH.	1	3	10	11	7	2.38	0.664
2. Regular refresher seminars on OSH are conducted in your workplaces.	1	4	9	10	8	2.38	0.704
3. Safety and health guidelines are provided for all the work tasks in the health facilities.	2	3	10	9	8	2.44	0.733
4. Safety and health information is adequately communicated throughout your workplaces.	0	5	10	9	8	2.38	0.664
5. You understand hazards in your workplaces well.	1	5	10	8	8	2.47	0.711
6. Occupational Safety and Health Officers carry out inspections of your facilities	1	4	9	10	8	2.38	0.704
7. Workplace OSH Audits are regularly conduct in the facilities	1	3	11	10	7	2.41	0.662
8. You understand the Health Sector OSH Policy well.	0	3	11	11	7	2.31	0.603
9. You understand the Occupational Safety and Health Act well.	1	3	10	10	8	2.34	0.685
Aggregate						**2.39**	**0.681**

(5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree)

The performance of OSH Awareness practices within the Health Management is illustrated in Table 4.10**.**

Table 4. 10: Performance of Management OSH Awareness

Indicators of Performance	5	4	3	2	1	Mean	SD
1. OSH trainings attended	0	1	4	13	14	1.75	0.598
2. OSH refresher seminars conducted in workplaces	0	1	5	14	12	1.84	0.859
3. Work task OSH guidelines provided	0	0	9	11	12	1.91	0.583
4. OSH information communicated in the workplaces	0	2	7	9	14	1.69	0.704
5. Workplace hazards known	2	4	6	12	8	2.38	0.757
6. Facility inspections conducted by DOSHS	0	1	7	13	11	1.94	0.556
7. OSH Audits done for health facilities	1	1	7	12	11	2.03	0.469
8. Provisions of OSH policy known	0	1	8	10	13	1.91	0.637
9. Provisions of OSH Act known	1	1	5	14	11	1.97	0.474
Aggregate						**1.94**	**0.626**

Scoreboard

Frequency of implementation (Number)	≥4	3	2	1	0
Scale	**5**	**4**	**3**	**2**	**1**

4.4.1 Occupational Safety and Health Training and Refresher Seminars

From the results in Table 4.7, 5.6% (n=5) of the health workers strongly agreed that they had received a training specifically on occupational safety and health while 25.6% of them strongly disagreed. The proportion of respondents who agreed were 12.2% while those who disagreed were 33.3%.

Among the respondent, 40.0% (n=36) had certificates of participation in a training on Infection Prevention and Control. Of the respondents, 52.2% (n=50) claimed to have participated in a training on Waste Management and/or Injection Safety, but they had no certificates. None of the respondents had a certificate of training specifically on OSH. Specific training in occupational safety and health among the health workers recorded a mean of 47.4% (2.37). These results indicated that OSH training among the health workers was below average.

According to the results in Table 4.8, 47.8% (n=43) of the health workers had not attended any training on occupational safety and health, while 40.0% of them had

attended one training. About 7.8% of the health workers had attended two OSH trainings, while 4.4% of them indicated they had attended three. According to these results, the level of performance of this OSH element was 33.8.0% (mean=1.69). The standard deviation was 0.685 presenting good agreement of the results among the respondents.

From the results in Table 4.9, 3.13% (n=1) of the members of the Health Management strongly agreed they had received a specific training in occupational safety and health while 21.9% of them strongly disagreed. Among the respondents, 9.4% agreed while 34.4% of them disagreed. Training of the Health Management specifically on OSH had a mean of 47.6% (2.38). None of the respondents had a certificate of training specifically on OSH. About 3.13% (n=1) among the members of health executive claimed to be undertaking a postgraduate course in OSH.

As shown in Table 4.10, approximately 43.8% (n=14) of the health management had not attended any training on occupational safety and health, while 40.6% had attended one such training. Of the respondents, 12.5% had attended two OSH trainings while 3.13% of them indicated they had attended three. According to these results, performance of OSH training within the Health Management scored 35.0% (mean=1.75) with good agreement of participants' responses (SD=0.598).

According to the results (Table 4.7), conducting of OSH refresher seminars posted a mean of 48.0% (2.40) according to health workers. No records of OSH-related seminars were found during documents review. The results in Table 4.8 show that 50% (n=45) of the health workers could not recall any OSH refresher seminar held, while 41.1% indicated one seminar. About 6.7% of the respondents said two seminars had been conducted in their health facilities, while 2.2% had attended three. According to these results, performance of this OSH practice among the health workers was 32.2% (mean=1.61).

The results in Table 4.9 show that the practice of conducting occupational safety and health refresher seminars scored a mean of 47.6% (mean=2.38) according to the members of Health Management. The results in Table 4.10 show that 37.5% (n=12) of the members of Health Management did know of any OSH refresher seminar held, while about 43.8% knew of one. Approximately 15.6% of the respondents said they were aware of two seminars held, while 3.13% indicated three. According to these results, the performance of this OSH component was 36.8% (mean=1.84).

The results in Tables 4.8 and 4.10 show that according to both the health workers and Management, the performance of OSH training was approximately 33.6% (mean combined =1.68). Documents review did not reveal any record of OSH seminars having been held. These results showed that OSH training among the workers and the health management quite low.

4.4.2 Provision of Safety and Health Guidelines for Work Tasks

As shown in Table 4.7, 6.7% (n=6) of the health workers strongly agreed that there were safety and health guidelines for the various job tasks in their respective facilities while 24.4% strongly disagreed and 12.2% of them agreed. According to the responses, the provision of OSH guidelines for different work tasks was scored a mean of 48.8% (2.44) and a standard deviation of 0.751.

From the results in Table 4.8, 40.0% (n=36) of the health workers indicated they were not provided with safety and health guidelines for work tasks, while 34.4% indicated they were provided with one such guideline. About 16.7% of the workers said their facility had safety and health guidelines for two work tasks, while about 7.8% said it had for three work tasks, and 1.1% (n=1) of them indicated there was for at least four tasks. According to these results, the performance of this OSH practice was 39.2% (mean=1.96). The standard deviation was 0.706 showing there was good agreement of results.

From the results in Table 4.9, 6.3% (n=2) of the members of Health Management strongly agreed that there were safety and health guidelines for the various job tasks in the health facilities, while 25% of them strongly disagreed. Among the respondents, 9.4% agreed while 28% of them disagreed. According to the participants, the practice of providing OSH guidelines was 48.8% (mean=2.44) with good agreement of their responses (SD=0.733).

The results in Table 4.10 show that 37.5% (n=12) of the members of the Health Management indicated there were no OSH guidelines provided in the health workplaces. Approximately 34.4% of the respondents said there were guidelines for two work tasks, while about 28.1% alleged such guidelines were provided for three work tasks in the facilities. The mean for this OSH practice was 1.91, and the standard deviation was 0.583 indicating a performance of 38.2% and good agreement of results among the workers.

The results in Tables 4.8 and 4.10 show that according to both the health workers and Management, this OSH element performed at approximately 38.8% (mean combined =1.94). These guidelines were not found in the health facilities during physical verification. Only standard operating procedures aimed at ensuring quality and reliability of diagnostic results in the laboratories were found in 14.3% of the facilities. These findings showed that the provision of safety and health guidelines for the various work tasks was not satisfactory.

4.4.3 Communication of Safety and Health Information

From Table 4.7, 4.4% (n=4) of the health workers strongly agreed that safety and health information was adequately communicated throughout their health facilities, while 23.3% of them strongly disagreed. Of the respondents, 13.3% agreed while 28.1% of them disagreed. Based on these results, communication of OSH information scored 48.6% (mean=2.43) and a standard deviation of 0.733.

From the results in Table 4.8, 50.0% (n=45) of the health workers indicated there no OSH information communicated in their health facilities, while approximately 27.8% indicated there was one OSH information communicated. About 14.4% of the respondents said their facility had OSH information displays, while about 7.8% of them indicated there were at least four. According to this results the performance of this OSH element was 36.0% (mean=1.80). The standard deviation was 0.716 showing there was good agreement of the results.

The results in Table 4.9 show that 6.3% (n=2) the members of the Health Management strongly agreed that safety and health information was adequately communicated throughout the facilities, while 25.0% strongly disagreed and 9.4% of them agreed. As shown in Table 4.10, about 43.8% (n=14) of the members of the Health Management indicated that no OSH information was communicated in the health facilities. Approximately 28.1% of the respondents said there was one OSH information, while about 21.9% and 6.25% of the respondent indicated that two and three communications of OSH information, respectively, were done in their facilities. The mean for this OSH element was 1.69, and the standard deviation was 0.704 indicating 33.8% performance and good agreement of the results.

The results in Tables 4.8 and 4.10 show that according to the health workers and Management, the performance of this OSH practice was approximately 35.0% (mean combined =1.75). Physical observations conducted in the facilities did not reveal any OSH information displayed. Only four (4) facilities had "**Fire Exit**" signs scantly displayed. These results showed that OSH information was not communicated adequately within the health facilities.

4.4.4 Knowledge of Workplace Hazards among Workers and Management

From Table 4.7, 7.8% (n=7) of the health workers strongly agreed that they understood their workplace hazards well, while 24.4% of them strongly disagreed. Among the respondents, 10.0% agreed, and 35.5% of them disagreed. According to the responses,

knowledge of workplace hazards among the health workers had a mean of 48.2% (2.41).

Results in Table 4.8 show that 18.7% (n=17) of the health workers could not identify any workplace hazard correctly, while 40.0% (n=36) of them got one correct each. Approximately 26.7% and 10% of the respondents were right on two and three workplace hazards respectively. About 4.4% of the participants identified at least four hazards correctly. This OSH element had a mean of 2.41 and standard deviation of 0.671 indicating a performance of 48.2% and good agreement of the results.

From the results in Table 4.9, about 3.13% (n=1) of the members of the Health Management strongly agreed they understood hazards in their workplaces well, while 25.0% of them strongly disagreed. Among the respondents, 15.6% agreed and 25.0% of them disagreed. According to the Health Management, the knowledge of workplace hazards scored 49.4% (mean=2.47).

According to the results in Table 4.10, 25% (n=8) of the members of the Health Management did not list any correct workplace hazard. While 6.25%, 12.5%, and approximately 18.8% of the respondents could correctly listed four, three, and two workplace hazards respectively, 37.5% of them knew only one such hazard each. Based on these results, performance of this element was 47.6% (mean=2.38).

From the results in Tables 4.8 and 4.10, the performance of this OSH component according to both the health workers and Management was 48.0% (mean combined = 2.40) indicating that knowledge of workplace hazards within the health workforce and Management was below average.

4.4.5 Competent OSH Inspections and Audits

From the results in Table 4.9, 3.13% (n=1) of the members of the Health Management strongly agreed OSH inspections were conducted, while 25.0% of them strongly

disagreed. Among the respondents, 12.5% agreed and 31.13.0% of them disagreed. According to the respondents, the practice of carrying out competent OSH inspections scored 47.6% (mean=2.38).

The results in Table 4.10 showed that among the members of the Health Management, approximately 34.4% (n=11) said there were no health facility OSH inspections conducted by the Directorate of Occupational safety and Health. About 40.6% of the respondents said that one such inspection had been done, while 21.9% indicated two. About 3.13% claimed that three OSH inspections had been done in their health facilities by DOSHS. These results suggested that the performance of this element was 38.8% (mean=1.94) and the agreement of the responses was good (SD=0.637).

These results (Table 4.9) showed that among the participants, 3.13% (n=1) of the respondents strongly agreed OSH audits were conducted, while about 21.9% of them strongly disagreed. Approximately 9.4% agreed while 31.3% of them disagreed that the audits were carried out in the health facilities. Based on the responses, the execution of OSH audits was 48.2% (mean=2.41).

According to the results in Table 4.10, nearly 34.4% (n=11) of the participants indicated there were no OSH audits conducted in the health facilities. About 37.5% of the respondents said that one such audit had been carried out, while approximately 21.9% indicated two. About 3.13% held that three OSH audits had been done and another 3.13% of the informants said at least four such audits were done.

Based on these results, the performance of this OSH component was 40.6% (mean=2.03) with good agreement of the results (SD=0.469). Documents review failed to get any inspection report by an OSH Officer or workplace OSH audit report for any health facility. These revelations suggested that competent OSH inspections and audits were not adequately conducted within the health facilities.

4.4.6 Knowledge of OSH Policy & OSH Act within Health Management

From the results in Table 4.9, none of the members of Health Management strongly agreed they understood the health sector OSH policy well, but 21.9% of them strongly disagreed. Among the respondents, 9.4% agreed and 34.4% of them disagreed.

According to the results (Table 4.9), 3.13% (n=1) of the respondents strongly agreed they understood Occupational Safety and Health Act well, while 25% of them strongly disagreed. The results further indicated that 9.4% of the respondents agreed while 31.3% of them disagreed that they understood the OSH Act well. These results indicated that knowledge of the health sector OSH policy and OSH Act among the members of Health Management scored a mean of 46.2% (2.31) and 46.8% (2.34) respectively.

The results in Table 4.10 show that among the members of the Health Management, nearby 40.6% could not identify a single requirement of the health sector OSH policy correctly. Of the respondents, 31.3% recognized only one requirement of the OSH policy correctly, and 25.0% knew two of the policy provisions each. Knowledge of three OSH policy requirements was recorded by 3.3% of the respondents. According to results, performance of this OSH indicator was 38.2% (mean=1.91) with good agreement of results (SD=0.637).

These results (Table 4.10) further indicate that about 34.4% (n=11) of the members of Health Management could not identify any provision of OSH Act, while 43.8% of them could pinpoint one. About 15.6% (n=5) of the participants knew two while 3.13% of them were familiar with three requirements of the Act. Additionally, 3.13% correctly identified at least four of the provisions. The mean performance of this OSH element was 39.4% (mean=1.97) with good agreement of results (SD=0.474). From these results, it was deduced that knowledge of the health sector OSH policy and the Kenya OSH Act within the Health Management was below average.

The GOK-OSHA (2007) requires employers to ensure the provision of the necessary OSH training and information to all persons in the workplace. According to the Act, OSH information should be communicated through displays in the workplaces. The management is also obligated to ensure safety instructions are given and refresher seminars conducted regularly. The Management and workers should be familiar with their workplace hazards. The MOH (2014a) demands all health workers to be given OSH specific training. The Health Management is mandated to establish and communicate safety and health guidelines for the various work tasks in their workplaces (GOK-OSHA, 2007; MOH, 2014a). The OSH Act requires the organizations' Management to understand it and maintain its copies.

According to the GOK-OSHA (2007), DOSHS is responsible for conducting inspection and training in all workplaces. The Act further requires OSH audits to be carried out in all the workplaces by competent persons. The HSE (2011) provides that the managers should ensure that regular audits are carried out in their workplaces and this requirement is echoed in the MOH (2014a). The latter states that the Health Managements must ensure that OSH audits are carried out in their facilities regularly.

The results in Table 4.8 showed that health workers' knowledge of workplace hazards recorded the highest mean (Mean = 2.41) while OSH refresher seminars attended recorded the lowest mean (1.61). The highest agreement among the responses was recorded on OSH seminars attended (SD = 0.424) while the least agreement was recorded on OSH information communicated (SD = 0.716). The aggregate mean and standard deviation were 1.89 and 0.667 respectively, representing 37.8% performance of OSH awareness and good agreement of responses from the participants.

From results in Table 4.10, Workplace hazards known posted the highest performance, 47.6% (mean=2.38) while OSH audits recorded the highest agreement (SD = 0.469). Communication of OSH information in the workplaces scored the lowest mean, 33.8% (1.69) while OSH refresher seminars posted the lowest agreement (SD = 0.859) of

responses from participants. The aggregate mean was 1.94 translating to 38.8% performance of OSH awareness within the Health Management. The aggregate standard deviation for OSH awareness among the Health Management was 0.626, indicating good agreement of results.

The performance of OSH awareness among the health workers and the Health Management was approximately 38.6% (mean combined = 1.93) according to the results in Tables 4.8 and 4.10. These results exhibited that the performance of OSH awareness among the health workers and the Management was very low. It was deduced that OSH awareness affected OSH performance in the public dispensaries and health centres.

These findings were in agreement with Kaaria (2015) who concluded that training affected OSH performance in supermarkets; and Rotich & Kwasira (2015) who affirmed that sensitizing workers on an OSH programme was critical for its implementation. According to Maseko (2016), training of workers in safety and health is fundamental in the safety and health management and ensures competence and safe conduct, among workers in the discharge of their duties, which results in a firm culture of prevention.

Okumu (2016) found that the productivity of workers increases when they are trained in occupational health and safety practices, but declines if the OSH awareness is not sustained. Oluoch *et al* (2017) concluded that occupational safety and health awareness affects workers' consciousness of their work environment. Tait *et al.* (2018) concluded that training on occupational safety and health had great positive impact on OSH practices.

4.5 Management's Commitment to Implement OSH Practices

The results in Table 4.11 show the agreement of health workers on Management Commitment to implement OSH practices.

Table 4. 11: Management Commitment to OSH Practices

Practices	5	4	3	2	1	Mean	SD
1. The health management provides funds for Occupational Safety and health in the facility	6	10	21	30	23	2.40	0.756
2. Occupational safety and health performance targets form part of Annual Work Plans	5	10	20	31	24	2.34	0.749
3. OSH is regularly an agenda in health management meetings	5	11	22	29	23	2.40	0.744
4. The health management conducts regular inspections of work environments in the facility	7	9	20	32	22	2.41	0.744
5. The management demonstrates visible concern and commitment to safe and healthy work environment	6	10	22	28	24	2.42	0.760
Aggregate						**2.39**	**0.751**

(5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree)

The results in Table 4.12 show the perceived major challenges faced by the Health Management in implementing occupational safety and health Practices in the health facilities.

Table 4. 12: Perceived Major Challenges in Implementing OSH Practices

Challenge	Frequency	Percentage
Lack of sufficient OSHawareness within health Management	18	32.1%
Limited financial resources for various competing needs	29	51.8%
Lack of cooperation from workers	2	3.6%
Lack of adequate staff	4	7.1%
Cultural believes and traditions	3	5.4%
Totals	**56**	**100%**

The performance of Management commitment to OSH Practices is shown in Table 4.13.

Table 4. 13: Performance of Management Commitment

Indicators of Performance	5	4	3	2	1	Mean	SD
1. Provision funds for OSH in the facility	0	10	14	31	35	1.99	0.705
2. OSH performance targets in management Work Plans	0	9	13	31	37	1.93	0.701
3. OSH agenda in health management meetings	1	8	15	30	36	1.98	0.718
4. Inspections of work environments by health management	1	9	14	29	36	1.97	0.712
5. Visible Management concerns and commitments to safety and health	0	11	13	28	38	1.97	0.732
Aggregate mean						**1.97**	**0.714**

Scoreboard

Frequency of implementation (Number)	≥4	3	2	1	0
Scale	**5**	**4**	**3**	**2**	**1**

4.5.1 Provision of Funds for OSH Activities

As shown in Table 4.11, 6.7% (n=6) of the health workers strongly agreed that funds were provided for OSH activities within the health facilities while 25.6% of them strongly disagreed. Of the respondents, 11.1% agreed while 33.3% of them disagreed that the Management provided the funds. Based on the results, the practice of providing funds for OSH scored a mean of 48.0% (2.40) with good agreement of the results (SD=0.756).

From the results in Table 4.13, 40.0% (n=36) of the health workers indicated that the Management did not provide funds for OSH activities, while about 31.1% of them indicated the funds had been provided once. About 15.6% and 11.1% of the respondents held that their facility had been funded for OSH activities twice and thrice respectively.

According to these results, the provision of funds for OSH activities scored 39.8% (mean=1.99). The standard deviation was 0.705 showing there was good agreement of the results among the respondents. Documents review did not find any documentary

proof that funds were allocated specifically for OSH activities in any of the health facilities. These results showed that specific funding of OSH activities was not visible.

4.5.2 Integration of OSH in Management Plans

According to the results in Table 4.11, 5.6% (n=5) of the health workers strongly agreed that OSH performance targets were part of the Annual Work plans, while 26.7% of them strongly disagreed. Among the respondents, 11.1% of them agreed while 34.4% of them disagreed. The respondents were in good agreement (SD=0.749) that inclusion of OSH performance targets in Annual Work-plans scored 46.8% (mean=2.34). Occupational Safety and Health activities were not found in the County health sector work plans during documents review conducted in the facilities and management level.

The results in Table 4.13 show that about 41.1% (n=37) of the health workers indicated that OSH was not part of Management work plans, while approximately 34.4% of the respondents said OSH had been included in annual work plans once. About 14.4% and 10.0% of the respondents held that OSH had been included in the work plans twice and thrice respectively. The mean performance of this OSH element was 38.6% (mean=1.93), with good agreement of the results (SD=0.701). These findings showed that implementation of OSH practices was not a felt Health Management performance objectives and, therefore, not incorporated in management plans.

4.5.3 Inclusion of OSH in Management Meetings

As illustrated in Table 4.11, 5.6% (n=5) of respondents strongly agreed that OSH was discussed in Management meetings regularly, while 25.6% of them strongly disagreed. The results further indicated that 12.2% of the respondents agreed while 32.2% of them disagreed. According to the respondents, inclusion of OSH agenda in the executive meetings had a mean of 48.0% (2.40).

From the results in Table 4.13, nearly 40.0% (n=36) of the health workers indicated that OSH was not an agenda in any Management meetings. About 33.3% of the respondents said OSH had been discussed once in a Management meeting, while approximately 16.7% among them purported that this had happened twice. While nearly 8.9% of the respondents said that OSH had been in executive meetings thrice, approximately 1.1% (n=1) of participants said this had occurred at least four times.

From these results, the performance of this OSH component scored 39.6% (mean=1.98) and the agreement of the results among the respondents was good (SD=0.718). Documents review did not find any record of a meeting with OSH as an agenda either at the management or facility level. These findings indicated that OSH issues were not incorporated in executive meetings regularly. This suggested that OSH performance in the health facilities was not felt as a Health Management priority.

4.5.4 Inspections of Work Environments by Health Management

As presented in Table 4.11, 7.8% (n=7) of the health workers strongly agreed that the Management conducted regular inspections of work environments in their facilities. Nearly 25.6% of the respondents strongly disagreed while 10.0% of them agreed and 35.6% disagreed. Approximately 22.2% of the participants were impartial. According to the responses, workplace inspections scored a mean of 48.2% (2.41).

From the results in Table 4.13, 40.0% (n=36) of the health workers said the Management did not conduct inspections of the work environments, while about 32.2% of them indicated that the Management did it once. About 15.6% and 10.0% of the respondents said that the Management had inspected work environments in their facility twice and thrice respectively. Approximately 1.1% (n=1) of the participants alleged this had happened at least four times.

According to these results, inspection of work environments by the Health Management performed at 39.4% (mean=1.97). The standard deviation was 0.712

showing there was good agreement of participant responses. Documents review did not find any OSH inspection or support supervision report for any facility either at the Health Management or health facility level. The findings indicated that the Health Management was not monitoring safety and health in the health facilities regularly. These results suggested that the Health Management did not consider safety and health as a management priority.

4.5.5 Management's Commitment to Safe and Healthy Work Environment

From the results in Table 4.11, 6.7% (n=6) of the health workers strongly agreed that the Management demonstrated visible concern and commitment to safe and healthy work environment in their facilities, while 25.6% of them strongly disagreed. The results further showed that 10.0% of the respondents agreed while 31.1% of them disagreed. According to the responses, visible concern and commitment of the Management to implement OSH practices scored 48.4% (mean=2.42).

Results in Table 4.13 show that about 42.2% (n=38) of the health workers indicated that the Health Management did not show concern and commitment to safe and healthy work environments. Approximately 31.1% of respondents said this had happened once, and about 14.4% held that this had occurred twice. Of the respondents, 12.2% said that the Health Management had shown visible concern and commitment three times.

The mean performance of this OSH element was 39.4% (mean=1.97), with good agreement of the results (SD=0.732). During physical observations, it was noted that all the eight diagnostic laboratories were operating without any biosafety cabinets. These results indicated that Management concern and commitment to safe and healthy work environments was not visible.

The GOK-OSHA (2007) requires organizations to support occupational safety and health and provide adequate resources for its implementation. This mandate is

resounded by the MOH (2014a) which stipulates that health managers at all levels must ensure the provision of funds for OSH activities.

Occupational safety and safety should be discussed in management meetings regularly (GOK-OSHA, 2007; MOH, 2014a). According to MOH (2014a) health managers at their levels must ensure occupational safety and health is integrated in their management plans. The management must carry out OSH inspections regularly in the workplaces; and be proactive in demonstrating concern and commitment to safety, health, and the work environment and encouraging others to follow (GOK-OSHA, 2007; MOH, 2014a).

The results in Table 4.12 show that 51.8% of the responses from the Health Management indicated that lack of sufficient funds for the various competing needs was their major reason for not implementing OSH practices. This finding suggested that occupational safety and health was not a priority objective within the Health Management and therefore, not considered in funding.

From results in Table 4.13 the provision of funds for occupational safety and health activities scored the highest mean, 1.99 (39.8%) while OSH performance targets in management work plans had the lowest mean of 38.6% (1.93). The performance of Management commitment to the implementation of OSH practices was not satisfactory, 39.4% (mean=1.97). From these results it was deduced that management commitment affected occupational safety and health performance in public dispensaries and health centres.

These findings concurred with previous studies. Surienty (2012) held that Management commitment affected implementation of occupational safety and health in Small Enterprises. Sawe (2013) found that commitment and implementation of occupation safety and health practices increased business productivity in Mumias Sugar Company. According to Ndegwa (2015), the challenges in OSH performance within the manufacturing sector are associated with lack of management commitment.

McGonagle *et al. (*2016) emphasized the importance of management commitment in OSH implementation. Tait *et al* (2018) concluded that Occupational Safety and Health is not a high management priority within the health sector.

4.6 Workers' Participation in OSH Activities

The results presented in Table 4.14 show the agreement of health workers on their participation in OSH activities.

Table 4. 14: Workers' Participation in OSH Activities

Practices	5	4	3	2	1	Mean	SD
1. The management always consults with health workers on occupational safety and health matters	7	9	20	32	22	2.41	0.744
2. There is a functional safety and health committee /appointed OSH focal person in the facility	6	11	22	29	22	2.44	0.751
3. There are clear OSH responsibilities in the health facility	6	10	21	30	23	2.40	0.756
4. You always report hazardous occurrences and situations in the facility to management	4	12	24	29	21	2.43	0.738
5. You always refuse to work in an unsafe or unhealthy environment until it is rectified	6	10	22	28	24	2.42	0.760
Aggregate						**2.42**	**0.750**

(5-Strongly agree; 4-Agree; 3-Neutral; 2-Disagree; 1-Strongly disagree)

The performance of workers' participation in OSH practices is shown in Table 4.15.

Table 4. 15: Performance of Workers' Participation in OSH Activities

Indicators of Performance	5	4	3	2	1	Mean	SD
1. Consultations of workers on OSH	0	6	16	37	31	1.97	0.633
2. OSH meetings held by SHC/OSHFP in the facility	1	8	15	30	36	1.98	0.719
3. OSH responsibilities communicated	0	7	12	35	37	1.90	0.665
4. Hazardous occurrences and/or situations reported	1	9	14	30	36	1.99	0.728
5. Refusals to work in unsafe conditions	0	9	13	30	38	1.92	0.707
Aggregate						**1.95**	**0.690**

Scoreboard

Frequency of implementation (Number)	≥4	3	2	1	0
Scale	**5**	**4**	**3**	**2**	**1**

4.6.1 Consultation of Workers on OSH Matters

As illustrated in Table 4.14, 7.8% (n=7) of the health workers strongly agreed that management always consulted with them on occupational safety and health matters, while 24.4% of them strongly disagreed. According to the results, 10.0% of the respondents agreed and 35.6% disagreed. The results showed Management consultation with workers on occupational safety and health matters had a mean 2.41 (48.2%) and a standard deviation of 0.744.

From the results in Table 4.15, about 34.4% (n=31) of the health workers indicated that the Health Management did not consulted them on safety and health issues, while approximately 41.1% of them said they had been consulted on one occasion. About 17.8% and 6.7% of the respondents held that the Management had done so twice and thrice respectively. None of the participants said they had been consulted more than three times.

The mean performance of this OSH element was 39.4% (mean=1.97), with good agreement of results (SD=0.633). Documents review in all the sampled facilities found no record of OSH-related consultation between the management and workers was

found. These findings showed that the Management's involvement of health workers in OSH matters was very low.

4.6.2 Safety and Health Committees / Appointed OSH Coordinators

From results in Table 4.14, 6.7% (n=6) of the health workers strongly agreed that there was a functional safety and health committee or an appointed OSH coordinator in their facilities, while 24.4% of them strongly disagreed. Among the respondents, 12.2% agreed while 32.2% of them disagreed. According to the responses, this OSH element scored a mean of 2.44 (48.8%) and a standard deviation of 0.751 representing a good agreement the responses.

Results in Table 4.15 show that 40.0% (n=36) of the health workers said that the safety and health meetings were not held in their health facilities, while approximately 33.3% of them said such a meeting had been held once. About 16.7% and 8.9% of the respondents indicated that these meetings had been held two and three times respectively. Approximately 1.1% (n=1) of the workers said these meetings had been held at least four times.

The mean performance of this OSH element was 39.6% (mean=1.98), with good agreement of results (SD=0.719). Physical observations revealed that only two facilities were legally obligated to have a safety and health committee, based on their worker populations. No record of Safety and Health committee meetings, or appointment of an OSH focal person in any of the facilities. The findings suggested that there were no functional safety and health committees or appointed OSH coordinators in the health facilities.

4.6.3 Occupational Safety and Health Responsibilities

As shown in Table 4.14, 6.7% (n=6) of the health workers strongly agreed that there were clear OSH responsibilities in their health facilities, while 24.4% of them strongly disagreed. Among the respondents, 11.1% agreed and 33.3% disagreed. From the

responses, the provision of OSH responsibilities scored a mean of 2.40 (48.0%) with good agreement of the results (SD=0.756).

According to the results in Table 4.15, nearly 41.1% (n=37) of the workers indicated that OSH responsibilities were not communicated. About 38.9% of the respondents said there was one OSH responsibility communicated. Approximately 13.3% of the respondents purported there were two, while almost 7.8% held that there were three OSH obligations communicated.

Based on these results, the performance of this OSH component was 38.4% (mean=1.92) with good agreement of responses (SD=0.665). However, no records of OSH responsibilities were found in any of the health facilities, during physical observations and documents review. These findings indicated that OSH responsibilities were not communicated adequately within the health facilities.

4.6.4 Reporting of Hazardous Occurrences and Situations

The results in Table 4.14 showed that 4.4% (n=4) of the health workers strongly agreed that they always reported hazardous occurrences and situations in their facility to the Management, while 23.3% of them strongly disagreed. Among the respondents, 13.3% agreed and 32.2% of them disagreed. These results showed that reporting of hazardous conditions and situations among the respondents had a mean of 48.6% (2.43) with a standard deviation of 0.738 indicating a good agreement of participant responses.

From the results in Table 4.15, about 40.0% (n=36) of the health workers indicated that they had never reported any dangerous occurrences or situations, while approximately 33.3% of them said they had reported on one occasion. About 15.6% and 10.0% of the respondents held that they had done so twice and thrice respectively. Nearly 1.1% of the participants said they had reported at least four times.

The mean performance of this OSH element was 39.8% (mean=1.99), with good agreement of results (SD=0.728). However, documents review in the facilities did not find any such reports. These findings showed that reporting of workplace OSH concerns by health workers was not visible.

4.6.5 Workers' Refusal to Work in Unsafe Conditions

From results in Table 4.14, 6.7% (n=2) of the health workers strongly agreed that they always refused to work in unsafe or unhealthy environment until the hazard was removed, while 26.7% of them strongly disagreed. Among the respondents, 11.1% agreed and 31.1% of them disagreed. The practice of health workers refusing to work in unsafe conditions scored a mean of 48.4% (2.42) with good agreement of the results among the participants (SD=0.760).

The results in Table 4.15 showed that 42.2% (n=38) of the health workers said that they had never refused to work in unsafe conditions until the situations were rectified, while approximately 33.3% of them indicated that they had done so once. About 14.4% and 10.0% of the respondents said that they had declined twice and thrice respectively.

The mean performance of this OSH element was 39.0% (mean=1.95), with good agreement of the results (SD=0.690). Documents review did not find any records of these refusals in the health facilities. These findings indicated that workers were not adequately declining to work in unsafe situations until the hazards were removed.

According to the GOK-OSHA (2007) and the MOH (2014a), the management should involve workers in OSH planning and decision making processes. A safety and health committee must be appointed in workplaces with at least twenty (20) workers, and safety coordinator in workplaces with fewer workers. The OSH Act mandates organizations to define and communicate OSH responsibilities to all persons in the workplaces, and requires workers to document and report to the management any hazardous condition, situation, and occurrence within their workplaces. The Act

provides every worker with immunity against discrimination for refusing to work in imminent danger after reporting, until it is corrected.

The results in Table 4.15 showed that workers' refusal to work in unsafe conditions had the highest mean (1.99) and the lowest agreement of responses from the participants (SD = 0. 728). Communicated OSH responsibilities recorded the lowest mean (1.90). The highest agreement of responses was recorded on consultation of workers by the Management on OSH matters (SD = 0.633). The performance of workers' participation was below average, 39.0% (aggregate mean=1.95). The mean standard deviation was 0.690 showing that there was good agreement of the results. Based on these results it was concluded that workers' participation affected occupational safety and health performance in public health facilities.

These findings were in concurrence with previous studies. Kaaria (2015) concluded that employees' participation influenced the implementation of OSH in Kenyan supermarkets. Ndegwa (2015) attributed the challenges in OSH performance within the manufacturing sector to lack of workers' cooperation. McGonagle *et al.* (2016) demonstrated that teamwork was fundamental in OSH activities. According to Mosburg (2019), reporting of occupational hazards at all levels is useful in identifying the burden of exposures and to inform remedial measures. Gbadago (2017) concluded that lack of a trained OSH coordinator was a reason for poor implementation of OSH policy in Tongu District Hospital.

4.7 Pearson's Product Correlation Analysis

Pearson's correlation was used to test linear relationship between the predictor and response variables. The computed Pearson's correlation coefficients for each of the research variables are shown in Table 4.16.

Table 4. 16: Pearson's Correlation Coefficients

	Variable	1	2	3	4
1	OSH Performance	1.000			
2	OSH awareness among HW & HM	0.6887	1.000		
3	Management commitment	0.8195	0.1903	1.000	
4	Workers' Participation in OSH	0.7183	0.4547	0.5556	1.000

***p<0.05* for one-tailed tests**

The results in Table 4.16 suggested that each of the three independent variables had linear relationship with OSH performance. The mean scores for the individual items in each of the independent variables were used to compute the correlation coefficients**.** The respective correlation coefficients (r) were 0.6887 for OSH awareness among health workers and management, 0.8195 for management commitment, and 0.7183 for workers' participation. The correlation coefficients were high indicating that there existed significant statistical relationship between each of the independent variables and OSH performance. This meant that each of the independent variables had direct effect on OSH performance.

High coefficients of correlation suggested a problem of multi co-linearity among the independent variables (Field, 2009). Variance inflation factors (VIFs) were analyzed to test multi co-linearity among the variables using the formula:

$$VIF = 1 / (1 - r^2)$$

The computed variance inflation factors for the independent variables were 1.90 for OSH awareness, 3.04 for management commitment, and 2.07 for workers' participation**.** According to Field (2009), the threshold for VIFs is 10. There was, therefore, no problem with multi co-linearity.

4.8 Linear Regression Analysis

Simple linear regression analysis was used to determine the statistical relationships between each of the independent variables and OSH performance. Regression

coefficients were computed for each of the independent variables using the regression equation:

$$\boldsymbol{\beta 1} = \frac{\sum[(\boldsymbol{xi}-\boldsymbol{x})(\boldsymbol{yi}-\boldsymbol{y})]}{\sum[(\boldsymbol{xi}-\boldsymbol{x})\boldsymbol{2}]}$$

Where:

$\boldsymbol{\beta_1}$ = the slope of regression line i.e. the amount of change in Y (dependent variable) due one unit change in X (independent variable)

$\mathbf{x_i}$ = the mean score for individual items in each of the independent variables

$\mathbf{y_i}$ = the mean score of performance for individual practice in the measured variables

x = mean of each $\mathbf{x_i}$ value

y = mean of each $\mathbf{y_i}$ value

$\sum$ = Sum of

Beta $_{\text{zero}}$ (β_0) which denoted the value of OSH performance (dependent variable) (Y) when the independent variable (X) was at zero was calculated using the formula:

$$\boldsymbol{Y = \beta_1 X + \beta_0}$$

Where:

$\boldsymbol{Y}$ = the measured value of the dependent variable (OSH performance)

$\boldsymbol{X}$ = measured value of each independent variable

$\boldsymbol{\beta_1}$ = the slope of regression line i.e. the amount of change in Y due one unit change in X

This direct model tested OSH awareness, management commitment, and workers' participation individually against the occupational safety and health performance. The results of linear regression analysis are shown in Table 4.17.

Table 4. 17: Linear Regression Results

Variable	Model 1		Model 2		Model 3	
	Raw	Standardized	Raw	Standardized	Raw	Standardized
Constant	**0.35**		**0.37**		**0.30**	
O/Awareness	**0.6810**	0.7526				
M/Commitment			**0.6680**	0.7026		
W/Participation					**0.6600**	0.7174
R	0.6887		0.8195		0.7183	
R^2	0.4743	0.8866	0.6716	0.7064	0.5160	0.5609

p<0.05

These results confirmed that there existed a direct and positive relationship between each of the independent variables and OSH performance. The prediction factor for the variables were: OSH awareness (0.6810, *p<0.05)*, Management commitment (0.6680, *p<0.05)*, and workers' participation (0.6600, *p<0.05).* These factors indicated reasonably strong positive relationships and, therefore, all the three independent variables were good predictors of OSH performance. These results showed that an increase of one unit in OSH awareness resulted in an increase of 0.681 units; a unit increase in management commitment predicted an increase of 0.668 units; and a unit increase in workers' participation foretold an increase of 0.660 units in OSH performance.

The respective coefficients of determination, R^2, were 0.474, 0.672, and 0.516 for OSH awareness, management commitment, and workers' participation respectively. Consequently, OSH awareness among health workers and Management explained 47.4%, Management commitment explained 67.2%, and workers' participation explained 51.6% of variance in OSH Performance.

4.9 Hypothesis Testing

The null hypothesis that "OSH performance in the public dispensaries and health centres is not affected by OSH awareness among the health workers and the

management, management commitment, or workers' participation"; was tested using ***t***-test. ***T***-statistic was computed for each of the variables by using the formula:

$$t = (\mu - M)/[s / (\sqrt{n})]$$

Where:

t = computed statistic for each variable

M = sample mean for each variable,

μ = assumed population mean = 3,

N = the sample size, and

s = standard deviation for each independent variable (i.e. OSH awareness, Management commitment, and workers' participation)

The computed *t*-statistics and their corresponding table critical values are shown obtained in Table 4.18.

Table 4. 18: Computed t-Statistics at α = 0.05

Variable	***N***	***M***	***S***	***μ***	**Computed *t*-statistic**	**Critical Values**
OSH awareness (H/Workers)	90	2.41	0.748	3	7.483	1.662
OSH awareness (H/Management)	32	2.39	0.681	3	5.067	1.696
Management commitment	90	2.39	0.751	3	7.706	1.662
Workers' participation	90	2.42	0.750	3	7.337	1.662

The computed *t*-statistic for each independent variable was compared to its corresponding *T*-table critical value for *N*. From the results in Table 4.18, the calculated *t*-statistics for OSH Awareness among health workers and health management were 7.483 and 5.067 compared to *t*-table critical values of 1.662 and 1.696 respectively. The *t*-statistics for management commitment and worker's participation were 7.706 and 7.337 respectively compared to the critical value of 1.662.

These results showed that the computed *t*-statistic for each of the null hypotheses (H_0: $\mu - 3 = 0$) was more than right-tail critical value of the *t*-distribution. The null hypotheses were, therefore, rejected in favour of the respective alternative hypotheses

(H_A: $\mu - 3 \neq 0$). The results meant that the occupational safety and health performance in the health facilities was affected by OSH awareness among health workers and Management, Management commitment, and workers' participation.

CHAPTER FIVE

CONLUSIONS AND RECOMMENDITIONS

5.1 Conclusions

Occupational safety and health performance in public dispensaries and health centres within Machakos County is affected by lack of inadequate components of work environments, OSH awareness among the health workers and Management, Management commitment, and workers' participation in OSH activities. The mean performance of these variables were 42.5%, 38.6% (mean=1.93), 39.4 (mean=1.97), and 39.0% (mean=1.95) respectively. Regression analysis results showed that an increase of one unit in OSH awareness, management commitment, and workers' participation predicted an increase of 0.681 units; 0.668 units; and 0.660 units in OSH performance respectively.

Natural ventilation and lighting in the public dispensaries and health centres were not adequate. Among the workrooms assessed, 79% had less ceiling heights than the specified minimum, while windows in 61.5% of the workrooms did not provide *through* ventilation. Among the workrooms assessed, 18.7% did not have the minimum permissible natural lighting. High risk of injury existed within the health facility work environments. Approximately 64.6% of the windows were found projecting to passages when open. All the patient examination couches had no mechanism to adjust heights. About 77.8% of the storage shelves had no equipment to reach materials in heights. Provision for safe movement into and out of the workrooms was insufficient. Among the workroom doors, 57.5% had less opening widths than the specified minimum, while the widths of 57.1% of passageways were less than the specified minimum and 61.9% of the passageways were obstructed. The presence of the Directorate of Occupational Safety and Health services was not felt in the public health facilities. Neither OSH inspections by the directorate nor expert OSH audits were found in any of the facilities. It was established in the course of the survey that

the Kenya OSH Act does not specify measurable standards for several OSH components of work environment.

Occupational safety and health awareness within the Management and among the workers affected OSH performance. The health workers and Management had no training specifically on OSH and OSH information was not communicated. OSH guidelines for work tasks were not provided in the health facilities. The health sector OSH Policy and the Kenya OSH Act were not understood well among both the health management and the workers, while inspections and audits by independent OSH experts were not carried out regularly in the facilities. Regression analysis results showed that a change of one unit in OSH awareness predicted a change of 0.681 units in OSH performance. The ***t***-test on the null hypothesis "OSH performance is not affected by OSH awareness among health workers and within the health Management" favoured the alternative hypothesis. The computed ***t***-statistics were 5.067 and 7.483 compared to table critical value of 1.662 and 1.696 respectively (Table 4.18).

The study results demonstrated that management commitment affected the Occupational safety and health performance in the health facilities. OSH activities were not funded, included in the annual performance targets, or discussed in management meetings. OSH inspections and/or support supervisions were also not conducted in the health facilities. Results of regression analysis showed that a change of one unit in Management commitment predicted a change of 0.668 units in OSH performance. The null hypothesis "OSH performance is not affected by Management commitment" failed in the *t*-test. The computed *t*-statistic was 7.706 against the table critical value of 1.662 (Table 4.18).

Occupational safety and health performance in public dispensaries and health centres is affected by workers' participation. Workers were not involved in decision making on matters concerning their safety and health and there was no safety and health committee or focal person in any of the facilities. OSH responsibilities were not

defined in the health workplaces and workers were neither reporting unsafe conditions in their workplaces nor refusing to work in imminent danger before the harmful situation was rectified. Results of regression analysis showed that a change of one unit in Workers' participation would cause a change of 0.660 units in OSH performance. The *t*-test results rejected null hypothesis "OSH performance is not affected by workers' participation". The computed *t*-statistic was 7.337 compared to table critical value of 1.662 (Table 4.18).

5.2 Recommendations

- The County Government should ensure that all the various OSH elements in their work environments are adequate.
- The Kenya Occupational Safety and Health Act, 2007 should be revised to include the measurable standards all elements of the work environments.
- All the health workers and members of the health management teams should be trained in occupational safety and health and the health sector OSH policy.
- Occupational safety and health targets should be integrated in the management performance plans and meetings.
- The Health Management should define and communicate OSH responsibilities to all persons in the health facilities and provide OSH guidelines for all the different work tasks.
- Further research may be conducted to assess the effects of other variables on OSH performance.

REFERENCES

Alberta Government (2011). Building an effective health and safety management system. WorkSafe Alberta Government, March 2011. Retrieved from: https://alberta.ca/publications/4906413

Alli, B. O. (2008). Fundamental Principles of Occupational Health and Safety. Geneva: International Labor Office

British Standard Institute (BSI) OHSAS 18001 (2007). Occupational Health and Safety Management Systems Requirements

European Union (2011). Occupational Health and Safety Risks in the Healthcare Sector: Guide to Prevention and Good Practice. Luxembourg: Publications Office of the European Union

European Union -OSHA (2010). Workplace Health Promotion for Employers: European Agency for Safety and Health at Work, 2010a

European Union -OSHA (2012). Worker Participation in Occupational Safety and Health, a Practical Guide: European Agency for Safety and Health at Work, 2012. Retrieved from: http://osha.europa.eu/en/publications/factsheets/93

Field, A. (2009). Discovering Statistics Using SPSS: Introducing Statistical Methods Series. ISM (London-England): SAGE Publishers

Gbadago, P., Sedem, N., Amedome & Honyenuga, B. Q. (2017). The Impact of Occupational Health and Safety Measures on Employee Performance at the South Tongu District Hospital: Global Journal of Medical Research: Volume 17 Issue 5. Online ISSN: 2249-4618 & Print ISSN: 0975-5888

GOK (1990). Factories and Other Places of Work Act: Safety and Health Committees Rules, 2004. Nairobi: Government Printer

GOK-OSHA (2007). Kenya Occupational Safety and Health Act. Nairobi: Government Printer

Health and Safety Authority (2006). Workplace Safety and Health Management: Practical Guidelines on the Implementation and Maintenance of an

Occupational Safety, Health and Welfare Management System. Dublin: Health and Safety Authority, Retrieved from: http://www.hsa.ie/eng/

Health and Safety Authority (2007). The Guide to Safety, health and Welfare at Work (General Application) Regulations. Dublin: Health and Safety Authority, Retrieved from: http://www.hsa.ie/eng/

Health and Safety Authority (2010). Health and Safety Management in Healthcare: Information sheet. Nov 2010, the Metropolitan Building, James Joyce Street, Dublin 1. Accessed 4th Nov. 2017 from: http://www.hsa.ie/eng/

Health and Safety Authority (2017). Safety and Health Management System. Retrieved from: http://www.hse.gov.uk/pubns

Health and Safety Executive (2008). Successful Health and Safety Management. Accessed 4th Nov. 2017 from: http://www.hse.gov.uk/pubns/books/hsg65.htm

Health and Safety Executive (2011). Leading Health and Safety at Work. Retrieved from: http://www.hse.gov.uk/pubns/

Health and Safety Executive (2013). Managing for Health and Safety. Retrieved from: http://www.hse.gov.uk/pubns/

http://osha.europa.eu/en/publications/factsheets/93,

https://shop.bsigroup.com/ProductDetail/?pid=000000000030148086

International Labor Organization (2001) Guidelines on Occupational Safety and Health Management Systems: Volume II. International Labor Office (ILO): Geneva

International Labor Organization (2010). Safety and Health at Work: International Labor Office (ILO): Geneva

International Labor Organization (2011). Occupational Safety and Health Management System: A Tool for Continual Improvements. World Day for Safety and Health at Work, Geneva: ILO

International Labor Organization (2012). Your safety and health at work: Basic ergonomics principles, Geneva: ILO

International Labor Organization (2018). Improving the Safety and Health of Young Workers. World Day for Safety and Health at Work, Geneva: ILO ISBN: 978-92-2-131650-3 (print) ISBN: 978-92-2-131651-0 (web pdf)

Kaaria, A. G. (2015). Factors Affecting the Implementation of Health and Safety in Supermarkets in Kenya. International Journal of Human Resource Studies, 5(2), 223-281

Kenya Ministries of Health (2011). Implementation Guidelines for the Kenya Quality Model for Health. Afya House, Nairobi, Kenya

Kenya Ministries of Health and IntraHealth International (2013). Report of the Occupational Safety and Health Risk Assessment. Nairobi: MsOH

Klevens, at el (2007). Estimating Health Care-Associated Infections and Deaths in US Hospitals, 2002. Public health reports, 122(2), 160-166

Kothari, C. R. (2004). Research Methodology: Methods and techniques (2nd Revised Edition). Jaipur: India: New Age International Publishers

Machakos CIDP (2015). Machakos County Integrated Development Plan, 2015. Retrieved from http://www.machakosgovernment.com/documents/CIDP.pdf

Machakos Health Information System [MHIS] (2017). Machakos Health Records and Information System. Machakos: Machakos Health

Maseko, M. M. (2016). Effects of Non-Compliance with the Occupational Health and Safety Act (No. 85 of 1993) Among the Food and Beverage Industries in Selected Provinces of South Africa

McGonagle, A. K., Essenmacher, L., Hamblin, L., Luborsky, M., Upfal, M., &Arnetz, J. (2016). Management Commitment to Safety, Teamwork, and Hospital Worker Injuries. Journal of hospital administration, 5(6), 46-52

Michigan Occupational Safety & Health Administration (2011). Safety and Health Management System Guidelines: Consultation Education & Training (CET) Division. Michigan (517) 322-1809

Ministry of Health (2010). National Infection Prevention and Control Guidelines for Health Care Services in Kenya: Nairobi: MOH

Ministry of Health (2014a). Occupational safety and health policy guidelines for the health sector in Kenya. Nairobi: MOH

Ministry of Health (2014b). Human Resources for Health Norms and Standards Guidelines for the Health Sector: Required investments for Equitable, and Adequate Capacity to Deliver the Kenya Essential package for Health. Nairobi: MOH

Ministry of Health (2016a). Occupational Exposure to Blood and Body Fluids and HIV Post-exposure Prophylaxis in Health Care Facilities in Kenya 2011 – 2014. Nairobi: MOH

Ministry of Health (2016b). Kenya Master Health Facilities List: DHIS, Nairobi: MOH

Mugenda, O. M & Mugenda, A. G. (2003). Research Methods: Quantitative and Qualitative Approaches, Revised edition. Nairobi: Act press

Mossburg S, et al (2019). Occupational Hazards among Healthcare Workers in Africa: A Systematic Review. Annals of Global Health. 2019; 85(1): 78, 1–13. DOI: https://doi.org/10.5334/aogh.2434

Naissuma, D. K. (2000). Survey Sampling Theory and Methods. Nairobi: Nairobi University Press

National Planning and Building Authority (NPBA), (2009). Planning and building Regulations, Volume 2 & 4

Ndegwa, P. W. (2015). Perceptual Measures of Determinants of Implementation of Occupational Safety and Health Programmes in the Manufacturing Sector in Kenya (Doctoral dissertation)

Ndejjo, R., Musinguzi, G., Yu, X., Buregyeya, E., Musoke, D., Wang, J. S. ... & Ssempebwa, J. (2015). Occupational Health Hazards among Healthcare Workers in Kampala, Uganda. Journal of Environmental and Public Health, 2015, 913741-913741

Newstrom, J. W. (2007). Organizational Behavior Human Behavior at Work (12th Ed.). London: Tata McGraw Hill

Nshunju, R. K. (2012). Compliance to Occupational and Public Health Requirements and Associated Factors in Barbershops and Hair Dressing Salons: A Case of Kinondoni Municipality, Dar es Salaam, Tanzania (Doctoral dissertation, Muhimbili University of Health and Allied Sciences)

Occupational Safety and Health Administration (2013a). Safety and Health Management Systems: Facts about Hospital Worker Safety- New York: U.S. Department of Labour

Occupational Safety and Health Administration (2013b). Safety and Health Management Systems: A Road Map for Hospitals- New York: U.S. Department of Labour

Okumu, O. J. (2016). The effect of Occupational Health and Safety Practices on organizational productivity a case of Mumias Sugar Company in Kenya. International Journal of Business and Management Invention ISSN (Online): 2319 – 8028, ISSN (Print): 2319 – 801X www.ijbmi.org. Volume 5 Issue 10, October. 2016 PP—108-113

Oluoch, I. et al (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).Volume 11, Issue 6 Ver. I (June. 2017), PP 35-41

Orodho, A. R. (2009). Elements of Social Research Methods. (2nd Ed). Knezja: Maseno, Kenya

Rotich, L. C. &Kwasira, J. (2015). Assessment of Success Factors in the Implementation of Occupational Health and Safety Programs in Tea Firms in Kenya: A Case of Kaisugu Tea Factory. International Journal of Economics, Commerce and Management. United Kingdom: Vol. III, 5, May 2015, ISSN 2348 0386

Rousson, V., Gasser, T. & Seiffer, B. (2002). Assessing Intrarater, Interrater and Test-Retest Reliability of Measurements. Strategic Methods, 21, 3431-6

Safe Work Australia (2011). How to Manage Work Health and Safety Risks: Code of Practice. Canberra, Australia: Safe Work SA

Safe Work Australia (2012). Guide for Major Hazard Facilities: Safety Management Systems. Retrieved from: http://www.safeworkaustralia.gov.au

Sanders, E., Thiongó, A., Okuku, H., Mwambi, J., Priddy, F., Shafi, J., Graham, S. (2010). High prevalence of Chlamydia Trachomatis and Neisseria Gonorrhoeae Infections among HIV Negative Men Who have Sex with Men in Coastal Kenya. Sexually Transmitted Infections, 19(6), 440- 441

Sawe, M. J. (2013). Effects of Occupational Health and Safety Practices on Employees' Productivity in Mumias Sugar Company, Kenya. Retrieved from: http://ir.mu.ac.ke:8080/xmlui/handle/123456789/668

Subhani, M.G. (2010). Study occupational health & safety management system (OHSMS) in Universities' context and possibilities for its implementation: A case study of University of Gavle., Msc Thesis University of Gavle

Surienty, L. (2012). Management Practices and OSH Implementation in SMEs in Malaysia. School of Management, USM Minden, Pulau Pinang

Tait, F. N. et al. (2018). Occupational Safety and Health Status of Medical Laboratories in Kajiado County, Kenya. Pan African Medical Journal. 2018; 29:65. doi:10.11604/pamj.2018.29.65.12578

Takele Tadesse &Mengesha Admassu (2006). Occupational Health and Safety: Lecture Notes for Environmental and Occupational Health Students. Ethiopia: University of Gondar

Wambilianga and Waiganjo (2015). Factors Influencing Compliance with Occupational Safety and Health Regulations in Public Hospitals in Kenya: A Case Study of Thika Level 5 Hospital

WHO (2010). Health Worker Occupational Health. In: WHO (Ed) Occupational Health - Health workers, Volume 2012. Geneva: WHO

WHO (2016). Health Workforce Requirements for Universal Health Coverage and the Sustainable Development Goals: Human Resources for Health. Observer, 17. Geneva: WHO

WorkSafe BC (2013). How to Implement a Formal Occupational Health and Safety Program. WorkSafe BC Publications

Zakari Mustafa; Clinton Aibavboa; Wellington Didi Thwala (2016). "Occupational Health and Safety Occupational Health and Safety." Pp. 1–18 in International Conference of Socio-economic Researchers ICSR 2016 SERBIA Conference Proceedings. ICSR SERBIA Conference

APPENDICES

APPENDIX 1: RESEARCH QUESTIONNAIRE FOR HEALTH WORKERS

Kindly provide the information requested in this form. You are protected from any form of harm. The information collected will be confidential and used exclusively for academic purposes. You have the right not to participate and to withdraw from the study at any stage. If you choose to withdraw, any information given will be destroyed.

DEMOGRAPHIC INFORMATION

1. Facility Number
2. Type of Facility: Health Center [ ] Dispensary [ ]
3. What is your designation? (*Tick as appropriate*)
   Nurse [ ] Clinical officer [ ] Laboratory staff [ ]
4. Gender: Male [ ] Female [ ]
5. What is your Age?
   21-30 years [ ] 31-40 years [ ]
   41-50 years [ ] 51-60 years [ ]
6. What is your highest level of professional qualification?
   Certificate [ ] Diploma [ ]
   Bachelor's Degree [ ] Master's Degree [ ]
7. How long have you worked in the facility?
   6 months - 1 year [ ] 1-3 years [ ] 3-5 years [ ] over 5 years [ ]

HEALTH WORKER OSH AWARENESS

8. Please indicate, with a tick [√], your level of agreement with the following statement as concerns your facility.**(5-Strongly agree; 4- Agree; 3-Neutral; 2-Disagree; 1- Strongly Disagree)**

S/No	Statements	5	4	3	2	1
a.	You have received a training specifically on occupational safety and health					
b.	Regular refresher seminars on occupational safety and health are conducted health in the facility					
c.	There are safety and health guidelines for all the various work tasks in the facility					
d.	Safety and health information is adequately communicated throughout the facility					
e.	You understand your workplace hazards well					

9. Using the scale in brackets, please indicate with a tick [√] the number of times each of the practices has occurred to you or in your facility.

(**5-At least four, 4- three, 3- two, 2- one, 1-zero**)

S/No	Practices	5	4	3	2	1
a.	Number of OSH Trainings you have attended					
	List titles of OSH trainings attended ……. ……. ……. …….					
b.	OSH Refresher seminars held in the workplace					
c.	Number of work tasks with OSH guidelines					
d.	No of Communications of OSH Information in the workplace					
e.	In the space below, list 5 workplace hazards you know ……. ……. ……. ……. ……. …….					

MANAGEMENT COMMITMENT TO OSH

10. Using the scale below, indicate your level of agreement with each of the following statements. Tick [√] one. **(5-Strongly agree; 4-Agree; 3-Neutral; 2- Disagree; 1-Strongly disagree)**

S/No	Statements	5	4	3	2	1
a.	The health management provides funds for Occupational Safety and health in the facility					
b.	Occupational safety and health performance targets are part of Annual Work Plans					
c.	OSH is regularly an agenda in health management meetings					
d.	The health management conducts regular inspections of work environments in the health facility					
e.	The management demonstrates visible concern and commitment to safe and healthy work environment					

11. Using the scale in brackets, please indicate with a tick [√] the number of times each of the practices has occurred to you or in your facility.
(**5-At least four, 4- three, 3- two, 2- one, 1-zero**)

S/No	Practices	5	4	3	2	1

a.	Funds provided for OSH activities					
b.	OSH performance targets integrated in Annual Work Plans					
c.	OSH agenda in Health Management meetings					
d.	Inspections of work environments by the Management					
e.	Visible Concern and commitment to OSH in work environment					

HEALTH WORKERS' PARTICIPATION IN OSH ACTIVITIES

12. Using the scale below, please indicate your level of agreement with each of the following statements. Tick [√] one. **(5-Strongly agree; 4- Agree; 3-Neutral; 2-Disagree; 1- Strongly Disagree)**

S/No	Statements	5	4	3	2	1
A.	The management always consults with health workers on occupational safety and health matters					
B.	There is a functional safety and health committee / appointed OSH focal person in the facility					
C.	There clear OSH responsibilities in the health facility					
D.	You always document hazardous occurrences and situations in the facility and report to management					
E.	You always refuse to work in unsafe or unhealthy environment until the situation is rectified					

13. Using the scale in brackets, please indicate with a tick [√] the number of times each of the practices has occurred to you or in your facility.
(**5-At least four, 4- three, 3- two, 2- one, 1-zero**)

S/No	Practices	5	4	3	2	1
a.	Consultations of health workers by Management on OSH matters					
b.	OSH meetings held by SHC / OSH Coordinators in the facility					
c.	OSH responsibilities provided					
d.	Hazardous occurrences and situations reported					
e.	Refusals to work in unsafe conditions until the hazard is removed					

THANK YOU FOR YOUR TIME. GOD BLESS YOU

APPENDIX 2: RESEARCH QUESTIONNAIRE FOR HEALTH MANAGEMENT

Kindly provide the information requested in this form. You are protected from any form of harm. The information collected will be confidential and used exclusively for study purposes. You have the right not to participate and to withdraw from the study at any stage. If you choose to withdraw, any information given will be destroyed.

DEMOGRAPHIC INFORMATION

1. What is your level of management?
   CHMT [ ] SCHMT [ ]
2. What is your gender?
   Male [ ] Female [ ]
3. What is your Age?
   21-30 years [ ] 31-40 years [ ]
   41-50 years [ ] 51-60 years [ ]
4. What is your highest level of professional qualification?
   Diploma [ ] Bachelor's Degree [ ]
   Master's Degree [ ] PhD [ ]
5. How long have you been in the health Management? Tick [√] one
   6 months - 1 year [ ] 1-3 years [ ]
   3-5 years [ ] over 5 year [ ]

HEALTH MANAGEMENT OSH AWARENESS

6. Using the scale below, please indicate your level of agreement with each of the following statements. Tick [√] one. **(5-Strongly agree; 4- Agree; 3-Neutral; 2-Disagree; 1- Strongly Disagree)**

S/No	Statements	5	4	3	2	1
a.	You have received a training specifically on occupational safety and health					
b.	Regular refresher seminars on occupational safety and health are conducted in your workplaces					
c.	You understand hazards in your workplaces well					
d.	You understand the Health Sector OSH Policy guidelines well.					
e.	You understand the Occupational Safety and Health Act well.					
f.	There are safety and health guidelines for all the various work tasks in your workplaces					
g.	Safety and health information is adequately communicated throughout the workplaces					
h.	Occupational Safety and Health Officers carry					

	out inspections of your facilities and get reports					
i.	You regularly conduct your workplace OSH Audits					

7. Using the scale in brackets, please indicate with a tick [√] the number of times each of the practices has occurred to you or in your facility.
   (**5-At least four, 4- three, 3- two, 2- one, 1-zero**)

S/No	**Practices**	**1**	**2**	**3**	**4**	**5**
a.	OSH trainings attended					
	List titles of OSH trainings attended: …… …… …… ……					
b.	OSH Refresher seminars on held in the workplace					
c.	OSH information Communicated in the facilities					
d.	Work task OSH guidelines provided					
e.	List 5 health workplace hazards you know: …… …… …… …… …… ……					
f.	Inspections by DOSHS					
g.	OSH Audits conducted					
h.	List 5 requirements of the Health Sector OSH policy you know …… …… …… …… ……					
i.	List 5 requirements of Occupational Safety and Health Act you know …… …… …… …… ……					

MAJOR CHALLENGES IN IMPLEMENTING OSH PRACTICES

8. What would you say are the major challenges faced by health management in implementing safety and health Act in health facilities? You can tick [√] more than one.

S/No	Challenge	Tick [√] as appropriate
1.	Lack of sufficient awareness among health management	
2.	Limited financial resources for various competing needs	
3.	Lack of cooperation from workers	
4.	Lack of adequate staff	
5.	Cultural believes and traditions	
6.	Any other (specify)	

THANK YOU FOR YOUR TIME. GOD BLESS YOU

APPENDIX 3: WORK ENVIRONMENT ASSESSMENT CHECKLIST

Sub-County Code……Facility Code……Workroom Code……

Environmental Elements	**Result**
Facility Building Approval	
The facility has a building plan (Yes / No)	
The Building plan is approved by DOSHS (Yes / No)	
Workroom	
Height of workroom in metres (indicate)	
Length of the room (indicate)	
Width of the room (indicate)	
Computed floor area (indicate)	
Computed Room volume disregarding height above 4.5m (indicate)	
Computed volume of Fixed cabinets (indicate)	
No of seats in the room (indicate)	
Windows	
Total window surface area (indicate)	
Total openable surface area of the windows (indicate)	
Type of Natural Ventilation in the room (Through / Single-sided)	
Shutter flat on wall when fully open (tick)	
Patient Examination Couches	
Patient examination couch with adjustable height (Yes / No)	
Material Storage Shelves	
Material storage shelves Stable (Yes / No)	
Material storage shelves obstructing windows (Yes / No)	
Stable equipment to reach height provided (Yes / No)	
Doors	
Openable width of the door in metres (indicate)	
Door shutter swings outward / inward (indicate)	
Locking system inside / outside (indicate)	
Passageway and Emergency Exits	
Width of Passageway in metres (indicate)	
Passageway obstructed (Yes / No)	
Emergency Exit door provided (Yes / No)	
Width of Emergency Exit (indicate)	

APPENDIX 4: RESULTS OF WORKROOM ASSESSMENTS

S/N	Workroom Code No.	Height in (m)	Floor Area (FA) (m^2)	Air Volume (AV) (m^3)	No of workers	AV per Worker (m^3)	Door					Windows						
							Opening Width (mm)	Shutter swings		Locking system		No	Total Area (m^2)	Open Area	Open Area as % of FA	Full Opening angle (^{o})	Type of Ventilation	
								Outward	Inward	Inside	Outside						TV	SV
1.	SC1/1/01	3.05	4.95	15.1	2	7.55	940	√		√		1	0.9	0.9	18.2	110	√	
2.	SC1/1/02	3.05	8.91	27.18	3	9.06	850		√	√		1	1.44	0.96	10.8	130		√
3.	SC1/1/03	3.05	8.91	27.18	2	13.59	850	√			√	1	1.44	0.96	10.8	180	√	
4.	SC1/1/04	3.05	10.89	33.21	3	11.07	900	√			√	1	1.44	0.96	8.8	100		√
5.	SC1/2/01	2.65	11.88	31.48	4	7.87	910		√		√	2	2.16	1.08	9.1	115	√	
6.	SC1/2/02	2.65	10.89	28.86	3	9.62	900		√	√		1	1..26	1,26	5.8	180	√	
7.	SC1/2/03	2.60	8.9	23.14	3	7.71	800		√	√		1	1.26	0.63	7.1	180		√
8.	SC1/2/04	2.62	9.0	23.58	2	11.79	800		√	√		1	1.26	0.63	7.0	105		√
9.	SC1/3/01	2.55	10.06	25.65	3	8.55	905	√			√	1	0.945	0.945	9.4	110	√	
10.	SC1/3/02	2.55	10.9	27.8	3	9.27	900	√			√	1	0.945	0.47	4.3	125		√
11.	SC1/3/03	2.55	11.0	28.05	2	14.03	850	√		√		2	1.89	0.945	8.6	100	√	
12.	SC1/4/01	2.65	9.0	23.85	2	11.93	750		√	√		1	1.26	0.63	7.0	180	√	
13.	SC1/4/02	2.65	9.0	23.85	2	11.93	800		√	√		1	1.26	0.63	7.0	180		√
14.	SC1/4/03	2.65	9.9	26.24	2	13.12	810	√			√	1	1.26	0.63	6.4	180	√	
15.	SC2/1/01	2.80	10.89	30.49	3	10.16	900	√		√		1	1.08	1.08	9.9	105		√
16.	SC2/1/02	2.85	10.89	31.04	4	7,76	1020	√			√	1	1.08	0.54	5.0	120		√
17.	SC2/1/03	2.85	9.9	28.22	3	9.41	950	√			√	1	1.08	1.08	9.9	125	√	
18.	SC2/1/04	2.85	8.91	25.39	2	12.7	850		√		√	1	1.08	1.08	12.1	115		√
19.	SC2/2/01	2.80	13.2	36.96	3	12.32	900		√	√		1	1.26	0.63	4.8	180		√
20.	SC2/2/02	2.85	9.72	27.70	2	13.85	900	√			√	1	1.26	0.63	6.5	135	√	
21.	SC2/2/03	2.85	9.9	28.22	3	9.41	885		√		√	1	1.26	0.63	6.4	155		√
22.	SC2/2/04	2.80	10.89	30.49	3	10.16	900	√			√	2	1.26	1.26	11.6	180	√	
23.	SC2/3/01	3.0	11.88	35.64	4	8.91	800		√	√		2	1.62	0.81	6.8	150		√
24.	SC2/3/02	3.0	8.19	24.57	3	8.19	860		√		√	1	0.81	0.81	9.9	180	√	

25.	SC2/3/03	3.0	8.91	26.73	2	13.37	850		√	√		1	0.81	0.81	9.1	180	√	
26.	SC2/4/01	3.0	9.9	29.7	3	9.9	904	√		√		1	0.945	0.47	4.7	160		√
27.	SC2/4/02	3.0	10.0	30.0	3	10.0	900		√	√		1	0.945	0.47	4.7	130	√	
28.	SC2/4/03	3.0	10.1	30.3	3	10.1	900	√		√		1	0.945	0.945	9.4	180		√
29.	SC3/1/01	2.7	12.16	32.83	4	8.21	905	√		√		2	2.16	1.08	8.9	95	√	
30.	SC3/1/02	2.7	10.88	29.38	3	9.79	900	√			√	2	2.16	1.08	9.9	110	√	
31.	SC3/1/03	2.7	9.8	26.46	2	13.23	850	√			√	1	1.08	1.08	11.0	100		√
32.	SC3/1/04	2.7	10.88	29.38	3	9.79	845		√	√		1	1.08	0.54	5.0	115	√	
33.	SC3/2/01	3.1	9.9	30.69	3	10.23	800		√		√	1	0.945	0.47	4.7	180		√
34.	SC3/2/02	3.05	10.80	32.94	3	10.98	785		√	√		1	0.945	0.945	8.8	180	√	
35.	SC3/2/03	3.0	10.89	32.67	5	6.53	800		√	√		1	0.945	0.47	4.3	180	√	
36.	SC3/2/04	2.9	8.19	23.75	2	11.88	800		√	√		1	0.945	0.945	11.5	165		√
37.	SC3/3/01	2.85	8.91	25.39	2	12.7	900	√			√	1	0.81	0.81	9.1	125		√
38.	SC3/3/02	2.85	12.06	34.37	4	8.59	800		√	√		2	1.62	1.62	13.4	180	√	
39.	SC3/3/03	2.80	10.88	30.46	4	7.61	805		√	√		1	0.81	0.81	7.4	135		√
40.	SC3/3/04	2.80	25.92	72.58	8	9.07	900	√		√		4	3.24	3.24	12.5	180	√	
41.	SC3/4/01	2.7	8.34	22.52	2	11.26	904	√			√	1	1.08	0.54	6.5	110	√	
42.	SC3/4/02	2.65	8.98	23.8	2	11.9	850		√	√		1	1.08	1.08	12.0	115		√
43.	SC3/4/03	2.7	10.9	29.43	3	9.81	900	√		√		1	1.08	0.54	5.0	180		√
44.	SC3/4/04	2.7	8.9	24.7	3	8.23	850		√		√	1	1.08	1.08	12.1	180	√	
45.	SC4/1/01	2.7	11.98	32.35	4	8.09	980	√			√	2	1.89	0.945	7.9	130	√	
46.	SC4/1/02	2.7	10.76	29.05	3	9.68	950	√			√	1	0.945	0.945	8.8	140		√
47.	SC4/1/03	2.7	10.40	28.08	3	9.36	950	√			√	1	0.945	0.945	9.1	180	√	
48.	SC4/1/04	2.65	11.16	29.57	4	7.39	900		√		√	1	0.945	0.945	8.5	165		√
49.	SC4/2/01	2.75	8.9	24.48	2	12.24	800		√	√		1	0.81	0.4	4.5	180	√	
50.	SC4/2/02	2.7	8.91	24.06	2	12.03	815		√	√		1	0.81	0.4	4.5	180		√
51.	SC4/2/03	2.7	9.9	26.73	3	8.91	850		√	√		1	0.81	0.4	4.0	155	√	
52.	SC4/2/04	2.7	13.2	35.64	3	11.88	800		√	√		2	1.62	1.62	12.3	180		√
53.	SC4/3/01	2.7	9.9	26.73	3	8.91	940	√		√		1	1.08	1.08	10.9	130		√

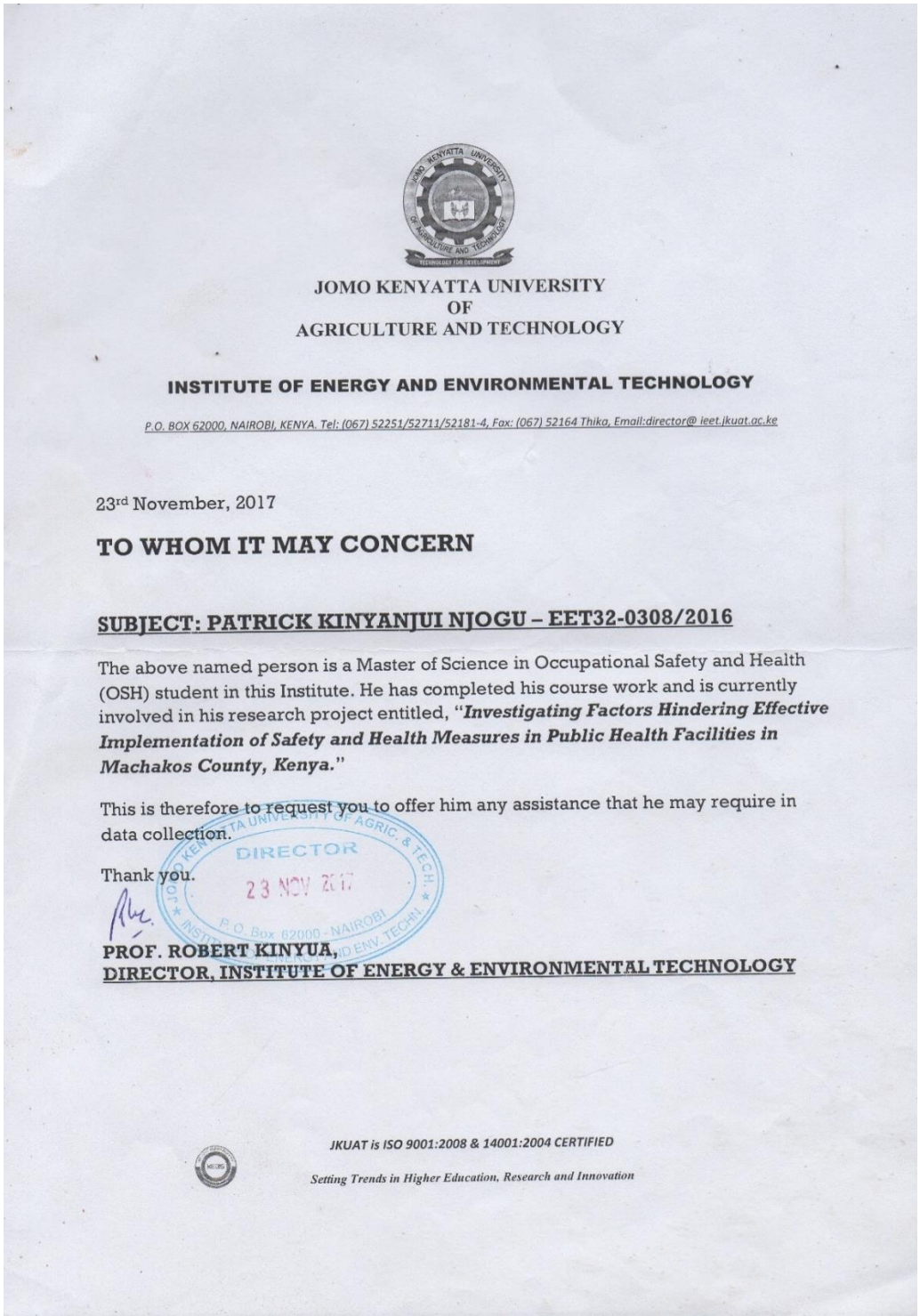
54.	SC4/3/02	2.55	8.91	22.72	2	11.36	920	√			√	1	1.08	1.08	12.1	180		√
55.	SC4/3/03	2.55	10.2	26.01	3	8.67	920	√			√	1	1.08	1.08	10.6	145	√	
56.	SC4/3/04	2.60	9.18	23.87	3	7.96	850		√	√		1	1.08	1.08	11.8	180		√
57.	SC4/4/01	2.7	9.9	26.73	2	13.37	800		√	√		1	1.26	0.63	6.4	180		√
58.	SC4/4/02	2.7	9.24	24.95	3	8.32	900				√	1	1.26	063	6.8	180		√
59.	SC4/4/03	2.65	11.12	29.47	4	7.37	850		√	√		2	2.16	1.08	9.7	135	√	
60.	SC4/4/04	2.7	8.90	24.03	3	8.01	850		√	√		1	1.26	0.63	7.1	180		√
61.	SC5/1/01	2.85	10.98	31.29	3	10,43	900	√			√	1	0.945	0.945	8.6	120	√	√
62.	SC5/1/02	2.85	11.52	32.83	3	10.94	904		√		√	2	1.89	0.945	8.2	105		√
63.	SC5/1/03	2.80	10.8	30.24	3	10.08	900		√	√		1	0.945	0.47	4.4	110		√
64.	SC5/1/04	2.85	9.72	27.70	3	9.23	900		√	√		1	0.945	0.47	4.8	180	√	
65.	SC5/2/01	2.7	9.6	25.92	2	12.96	800		√	√		1	1.08	1.08	11.3	150		√
66.	SC5/2/02	2.7	10.5	28.35	3	9.45	780		√	√		1	1.08	1.08	10.3	180		√
67.	SC5/2/03	2.7	9.8	26.46	2	13.23	800		√	√		1	1.08	1.08	11.0	125		√
68.	SC5/2/04	2.7	10.5	28.35	3	9.45	800		√	√		1	1.08	1.08	10.3	135	√	
69.	SC5/3/01	3.0	9.57	28.71	3	9.57	850		√		√	1	0.945	0.945	9.9	180		√
70.	SC5/3/02	3.0	10.23	30.69	3	10.23	840		√		√	1	0.945	0.945	9.3	155		√
71.	SC5/3/03	3.05	11.55	35.23	4	8.81	850		√	√		2	1.89	1.89	16.4	140	√	
72.	SC5/3/04	3.05	10.71	32.67	4	8.17	860		√	√		1	0.945	0.945	8.8	180	√	
73.	SC6/1/01	2.60	9.08	23.61	2	11.81	900		√		√	1	1.08	1.08	11.9	105		√
74.	SC6/1/02	2.55	10.4	26.52	2	13.26	900	√			√	1	1.08	1.08	10.4	160	√	
75.	SC6/1/03	2.55	9.9	25.25	2	12.63	850		√	√		1	1.08	1.08	10.9	180		√
76.	SC6/1/04	2.60	10.56	27.46	3	8.82	900	√			√	1	0.945	0.945	8.9	180		√
77.	SC6/2/01	2.7	11.22	30.29	3	10.1	900		√		√	1	1.08	1.08	9.6	130	√	
78.	SC6/2/02	2.65	10.2	27.03	3	9.01	885		√	√		1	1.08	1.08	10.6	155		√
79.	SC6/2/03	2.65	8.46	22.42	2	11.21	900	√		√		2	1.08	1.08	12.8	125	√	
80.	SC6/2/04	2.65	9.18	24.33	3	8.11	900		√	√		1	1.08	1.08	11.8	180		√
Totals								**32**	**48**	**34**	**46**	**96**					**37**	**59**

Key: TV. = Through Ventilation; SV = Single-sided Ventilation

APPENDIX 5: FACILITY APPROVALS, PASSAGEWAYSAND EXITS, MATERIAL AND PATIENT HANDLING SYSTEMS

S/N	Health Facility Code No.	Facility Building Plan				Passageways and Emergency Exits					Patient Examination Couches			Material Storage Shelves					
		Available		Approved by DOSHS		Width of the Passageway (mm)	Obstructed		Width of Emergency Exit Door	Marked Fire Assembly Point	Number assessed	Height Adjustable		Stable		Obstructing Window		With Equipment to reach height	
		Yes	No	Yes	No		Yes	No				Yes	No	Yes	No	Yes	No	Yes	No
1.	SC1/1	√			√	1350		√	800	√	1		√	√			√	√	
2.	SC1/2		√	0		900	√		800	√	1		√		√		√		√
3.	SC1/3		√	0		1000	√		0	√	2		√√	√		√			√
	SC1/4		√	0		1200	√		1020	√	1		√	√			√		√
5.	SC2/1		√	0		900		√	800	√	1		√	√			√		√
6.	SC2/2	√			√	1320	√		850	√	2		√√	√			√	√	
7.	SC2/3		√	0		1280	√		0	√	1		√		√	√			√
8.	SC2/4		√	0		1200	√		0	√	1		√	√			√		√
9.	SC3/1		√	0		900		√	885	0	2		√√	0	0	0	0	0	0
10.	SC3/2		√	0		1240		√	900	√	1		√		√		√		√
11.	SC3/3	√			√	885	√		800	√	1		√	√			√	√	
12.	SC3/4		√	0		1220	√		0	√	1		√	√		√			√
13.	SC4/1		√	0		800	√		0	0	2		√√		√	√			√
14.	SC4/2		√	0		860		√	800	√	2		√	√			√		√
15.	SC4/3		√	0		850	√		0	√	1		√	√		√			√
16.	SC4/4	√			√	1050		√	900	√	1		√	0	0	0	0	0	0
17.	SC5/1		√	0		1050		√	850	√	1		√	0	0	0	0	0	0
18.	SC5/2		√	0		1250		√	800	0	1		√	√			√		√
19.	SC5/3		√	0		900	√		0	√	1		√		√	√			√
20.	SC6/1	√			√	1200	√		0	√	2		√√	√			√	√	
21.	SC6/2		√	0		850	√		0	0	1		√	√			√		√
Totals		**5**	**16**	0	**5**		**19**	**8**		**18**	**27**	**0**	**27**	**13**	**5**	**6**	**12**	**4**	**17**

APPENDIX 6: AUTHORIZATION BY THE DIRECTOR OF IEET, JKUAT



JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY

INSTITUTE OF ENERGY AND ENVIRONMENTAL TECHNOLOGY

P.O. BOX 62000, NAIROBI, KENYA. Tel: (067) 52251/52711/52181-4, Fax: (067) 52164 Thika, Email:director@ ieet.jkuat.ac.ke

23rd November, 2017

TO WHOM IT MAY CONCERN

SUBJECT: PATRICK KINYANJUI NJOGU – EET32-0308/2016

The above named person is a Master of Science in Occupational Safety and Health (OSH) student in this Institute. He has completed his course work and is currently involved in his research project entitled, "***Investigating Factors Hindering Effective Implementation of Safety and Health Measures in Public Health Facilities in Machakos County, Kenya.***"

This is therefore to request you to offer him any assistance that he may require in data collection.

Thank you.

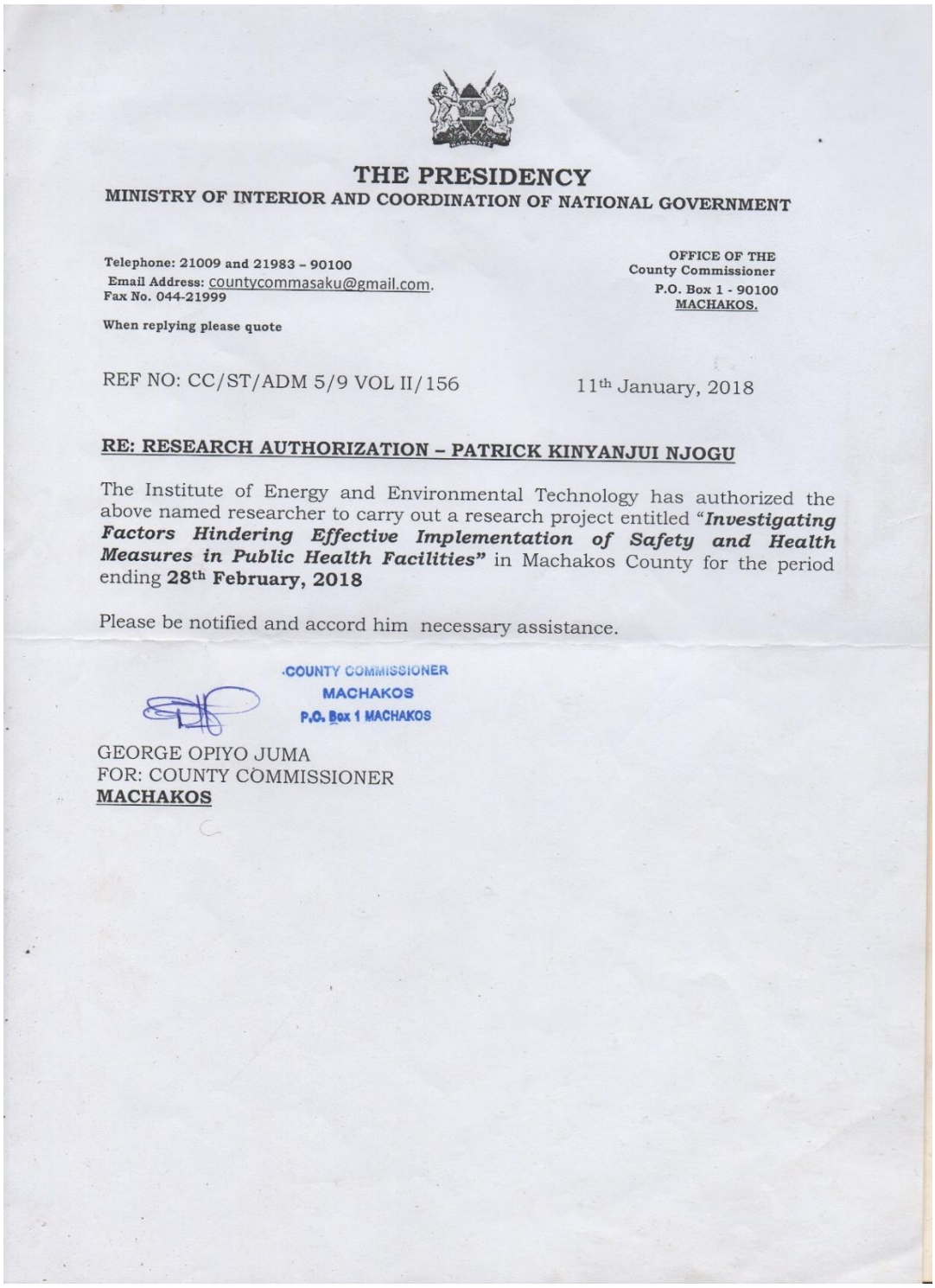
DIRECTOR
23 NOV 2017
P.O. Box 62000 - NAIROBI

PROF. ROBERT KINYUA,
DIRECTOR, INSTITUTE OF ENERGY & ENVIRONMENTAL TECHNOLOGY

JKUAT is ISO 9001:2008 & 14001:2004 CERTIFIED

Setting Trends in Higher Education, Research and Innovation

APPENDIX 7: AUTHORIZATION BY MACHAKOS COUNTY COMMISSIONER



THE PRESIDENCY
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telephone: 21009 and 21983 – 90100
Email Address: countycommasaku@gmail.com.
Fax No. 044-21999

When replying please quote

OFFICE OF THE
County Commissioner
P.O. Box 1 - 90100
MACHAKOS.

REF NO: CC/ST/ADM 5/9 VOL II/156

11th January, 2018

RE: RESEARCH AUTHORIZATION – PATRICK KINYANJUI NJOGU

The Institute of Energy and Environmental Technology has authorized the above named researcher to carry out a research project entitled "***Investigating Factors Hindering Effective Implementation of Safety and Health Measures in Public Health Facilities***" in Machakos County for the period ending **28th February, 2018**

Please be notified and accord him necessary assistance.

COUNTY COMMISSIONER
MACHAKOS
P.O. Box 1 MACHAKOS

GEORGE OPIYO JUMA
FOR: COUNTY COMMISSIONER
MACHAKOS

APPENDIX 8: AUTHORIZATION BY THE DIRECTOR OF HEALTH SERVICES

Authorised to visit Athi River H/C and Mlolongo H/C Dr. Mule

MAVOKO SUB-COUNTY MEDICAL OFFICER OF HEALTH
23 JAN 2018
P. O. Box 15 - 00204, ATHI-RIVER
Sign..........

REPUBLIC OF KENYA

GOVERNMENT OF MACHAKOS COUNTY
DEPARTMENT OF HEALTH & EMERGENCY SERVICES

Telephone: - (0145) 20594, 20847,
20234, 21685
Fax: 0145-20594

Office of The
County Director Health Services
P.O. BOX 646,
MACHAKOS
11th January, 2018

Ref: MOH/MKS/C4.VI/96

Patrick Kinyanjui Njogu
Reg. No. EET32-0308/2016
Institute of Energy and Environmental Technology
Jomo Kenyatta University of Agriculture and Technology

RE: RESEARCH AUTHORIZATION

Reference is made to the availed documents in relation to the above subject.

You are hereby allowed to carry out your research on "**Investigating Factors Hindering Effective Implementation of Safety and Health Measures in Public Health Facilities**" in Machakos County for the period ending 28th February, 2018.

You are required to furnish this office with a copy of your study report at the end of the study period.

You are instructed to report to the Sub County MOH before engaging any Public Health facility.

Dr.R.M. Muthama
County Director Health Services
MACHAKOS COUNTY

COUNTY DIRECTOR OF HEALTH, P.O.BOX 646 - 90100, 15 JAN 2018, MACHAKOS COUNTY

C.C
Chief Officer
Ministry Health & Emergency Services
MACHAKOS

Allowed to visit Kithimani, Kyasioni disp., Masinga, Kangonde, Mwatati disp. Dr. Mwangi D.C.

MEDICAL OFFICER OF HEALTH, MATUU DISTRICT HOSPITAL, P.O. BOX 54 MATUU YATTA

16/1/2018. Noted. Allowed to visit Muumandu, Mutituni H.C & Kimutwa, Kitini Disps

MEDICAL OFFICER OF HEALTH, MACHAKOS DISTRICT, 16 JAN 2018, P. O. Box 646-90100, MACHAKOS

17/1/2018 Noted & allowed to visiting Wamunyu H/C, Mumbuni Disp, Kabaa Dispensary, Katumba Disp. Dr. J. Mango

MWALA SUB-COUNTY HOSPITAL, P.O. Box 19, MWALA, 17 JAN 2018