

**OCCUPATIONAL HEALTH HAZARDS AND HEALTH
OUTCOMES AMONG HEALTH WORKERS, THE
DETERMINANTS AND COMPLIANCE TO SAFETY
STANDARDS IN THE HEALTH FACILITIES IN
KIGALI CITY, RWANDA**

MERCY CHINENYE NWANKWO

DOCTOR OF PHILOSOPHY

(Public Health)

**JOMO KENYATTA UNIVERSITY OF
AGRICULTURE AND TECHNOLOGY**

2018

Occupational Health Hazards and Health outcomes among health workers, the determinants and compliance to safety standards in the health facilities in Kigali City, Rwanda

Mercy Chinenye Nwankwo

A thesis submitted in partial fulfilment for the Doctor of Philosophy in Public health in the Jomo Kenyatta University of Agriculture and Technology

2018

DECLARATION

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

Signature..... Date

Mercy Chinenye Nwankwo

This thesis has been submitted for examination with my approval as University Supervisor

Signature..... Date

Prof. Simon Karanja, PhD

JKUAT, Kenya

Signature..... Date

Dr. Hilda Vasanthakaalam, PhD

JKUAT, Kenya

DEDICATION

I sincerely owe my work to God Almighty and to my beloved Parent and my siblings for their constant support and encouragement all through the program.

ACKNOWLEDGMENTS

My sincere and heart full of gratitude and thanks to God Almighty; for giving me wisdom, strength, direction, counsel and opportunity to complete the study, to God be the glory. I would like to thank the following people for their contribution towards the success of the study: My supervisor Professor Simon Karanja: my sincere thanks for your consistent support, encouragement, guidance and interaction throughout my study period. Prof. I sincerely declare my heartfelt gratitude and appreciation, thank you. I equally say a big thanks to the co-supervisor, Dr. Hilda Vasaanthakaalam; for the assistance.

I extend my sincere gratitude to Dr Anthony Luvanda our former institution Director; I thank you for the permission and guidance to gain access into this great JKUAT institution and the encouragement you gave me that made me start this program and made me stand up and face the challenges of this work. I whole heartedly appreciate and ask our good Lord to bless and reward you richly. My sincere thanks go to Prof. Gideon Kikvi who was the person that helped me form the foundation of this work that am completing now, many thanks to you. Dr Elizabeth Echoka my correction supervisor: I am sincerely grateful for the support you gave me during the last phase of this work without which I would have not made it this far. I really cherish the opportunity and support

My sincere thanks go to my friends Dr. Jaya Shukla and Caroline Nabuzale, for the encouragement and continuous support in various ways. My Siblings and other family members: sincere thanks to you for your continuous support, prayers and guide throughout the study, may God bless and reward you all richly.

TABLE OF CONTENT

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGMENTS	iv
TABLE OF CONTENT	v
LIST OF TABLES	x
LIST OF FIGURES	xv
LIST OF APPENDICES.....	xvi
ABBREVIATIONS AND ACRONYMS	xvii
OPERATIONAL DEFINITION OF TERMS	xix
ABSTRACT	xxiii
CHAPTER ONE.....	1
INTRODUCTION.....	1
1.1 Background Information	1
1.2. Statement of Problem.....	4
1.3. Justification for study.....	6
1.4 Research Questions	8
1.4. 1 Broad Objective	8
1.4. 2. Specific Objectives.....	8

CHAPTER TWO	10
LITERATUR REVIEW	10
2.1. Concept of Occupational health hazard	10
2.2. Conceptual Framework / Theoretical review	11
2.3. Health Hazards Prevalence rate among the health practitioners in Kigali Rwanda.....	21
2. 4. Different occupational hazards in workplace.....	22
2.5. Mitigation strategies to manage occupational health hazards and emergencies in the workplace.	25
2.6. Practice Compliance to international safety standards in health facilities	37
2.7. Factors that would help improve the workers practices in developing countries	38
2.8. Knowledge Gap.....	39
CHAPTER THREE	44
MATERIAL AND METHODS.....	44
3.1. Study Site	44
3.2. Study Design	46
3.3.1. Target Population.....	46
3.3.2 Study Population	46
3.4. Study Variables	47

3.4.1. Dependent Variable.....	47
3.4.2. Independent Variables.....	47
3.4.3. Inclusion Criteria for the selection of study participants:	48
3.4.4. Exclusion criteria for the selection of study participants:	48
3.5. Sample size.....	48
3.5.1. Sampling Technique.....	49
3.6. Instruments for data collection.....	50
3.6.1. Primary source of data: Questionnaire	50
3.6.3 Focused group discussion	51
3.6.4. Key informant interviews were carried out on occupational health and safety officers, chairperson of the health facility and the person in charge of hygiene and hospital waste management. Data collected qualitatively helped in providing complementary information to the quantitative data.	51
3.6.5. Secondary source of data	51
3.7. Validity and Reliability of the Instruments.....	51
3.8. Data collection	53
3.9. Data Analysis	54
3.10. Ethical Consideration.....	55
3.11. Response rate	56
CHAPTER FOUR.....	58

RESULTS.....	58
4.1 Demographic Characteristics of the Study Participants.....	58
4.2 The proportion of occupational health hazards cases among the health care workers in health facilities in Kigali Rwanda.	70
4.3 Different types of occupational hazards cases that exist in the health facilities in Kigali Rwanda.....	83
4.4 The human level associated factors to occupational hazards and health outcomes in the health facilities in Kigali;.....	85
4.5 Health institution associated factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali.....	89
4.6 The Medical waste management practices in the health facilities in Kigali, Rwanda.....	93
4.7 Hospital management practices on safety policy in relation with occupational hazards.....	102
4.8. Focus group discussion on Occupational health hazards, associated factors and compliance to safety standards.....	119
CHAPTER FIVE.....	127
DISCUSSION, CONCLUSION AND RECOMMENDATIONS.....	127
5.1 Discussions.....	127
5.1.1 Proportion of occupational hazards cases and health outcomes among the health care workers in health facilities in Kigali Rwanda.....	128

5.1.2 Types of occupational hazards and health outcomes that the health care workers in the study were exposed to as identified by the study participants in the health facilities in Kigali;	130
5.1.3 The Human level factors influencing occupational hazards and health outcome cases among the health care workers in the health facilities in Kigali;	130
5.1.4 Institutions level factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali.....	131
5.1.5 Medical waste management practices in the health facilities in Kigali, Rwanda.....	131
5.1.6 Compliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals	133
5.2. Conclusion.....	138
5.3 Recommendations	140
5.4 Suggestion for further studies	141
5.5 Contribution of the current study to learning.....	141
REFERENCES.....	143
APPENDICES	165

LIST OF TABLES

Table 3.1: the sum of 631 health care workers from the selected health facilities in the districts in Kigali city	46
Table 3.2: The distribution of study participants within the various selected health facilities.....	49
Table 3.3: Determination of Reliability and Validity of the Instruments	52
Table 3.4: Response rate	57
Table 4.1: Background Characteristics of the study participants (n = 237).....	59
Table 4.2: Other background characteristics information of the study respondents .	61
Table 4.3: The responses on the level of awareness of what occupational health and safety program in the work place (n = 237).....	64
Table 4.4: The study participants about their opinion of workplace hazards and safety measures	65
Table4.5: Distribution of respondent’s responses with regards to health facility safety prevention strategies.....	67
Table 4.6: Study findings with regards to health facility safety activities	68
Table 4.7: The study participants’ response outcomes with regards to hazards control measure in the health facilities.....	69
Table4.8: Findings on the hazards cases report system that is practiced in the health facility	70
Table4.9: Proportion of occupational hazards cases among health worker in the health facility (2015 – 2016).....	71

Table4.10: The relationship between the Proportion of Occupational hazards cases as it occurred in the three health facility	72
Table4.11: The Chi-square test on relationship between categories of the proportion of hazard cases and other influencing variables in the study.....	73
Table 4.12: Result of Multinomial analysis on the relationship between the proportion of hazards cases among health workers in the health facility and other study variables	75
Table4.13: Proportion of occupational hazards health outcomes among health worker in the health facility (2015 – 2016)	76
Table4.14: The chi-square test of association between occupational health hazard outcome cases in health facility and human associated factors (0.05 significant levels).....	77
Table4.15: The relationships between Occupational hazards health outcomes and the health care workers in the health facilities (0.05 significant levels).....	78
Table4.16: The relationships between Occupational hazards cases and the health care workers in the health facilities (0.05 significant levels).	80
Table 4.17: The Chi-square test on relationship between categories of the proportion of hazard cases and other influencing variables in the study.....	81
Table 4.18: The result of multinomial regression analysis on influencing variables to proportion of the health outcomes cases in the study	82
Table 4.19: Different types of occupational hazards cases that exist in the health facilities in Kigali Rwanda	83
Table 4.20: The different types of occupational hazards health outcomes cases that exist in the health facilities in Kigali Rwanda.	84

Table4.21: The human level associated factors to occupational hazards and health outcomes (n-237)	85
Table4.22: The relationship between the human associated factors and other study variables at level of 0.05 significant).n = 237.....	86
Table 4.23: Result of Multinomial analysis on the relationship between the human associated factors occupational hazards and health outcomes among health workers in the health facility and other study variables.....	88
Table 4.24: Distribution of participants' responses on Health institution associated factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali	89
Table 4.25: Distribution of the relationship between categories of Institution associated factors with occupational hazards and health outcomes and other variables at level of 0.05 significant difference of p-value	90
Table 4.26: Result of Multinomial analysis on the relationship between the Institutions associated factors occupational hazards and health outcomes among health workers in the health facility and other study variables	92
Table 4.27: The study participants 'responses with regards to Medical waste management practices in the health facilities (n= 237)	94
Table 4.28: Distribution of the relationship between the health facility waste management practices and other variables at level of 0.05 significant difference of p-value (A)	95
Table 4.29: Distribution of the relationship between the health facility waste management practices and other variables at level of 0.05 significant difference of p-value (B).....	97

Table 4.30: Health facility inspection report.....	99
Table 4.31: Distribution of multi-nominal regression analysis of variables influencing waste management system.....	101
Table4.32: The proportion of the Participants responses on Hospital management practices on safety policy in relation with occupational hazards (n = 237).....	102
Table4.33: The responses of the participants on the level of ccompliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals.....	103
Table 4.34: Distribution of study Participants responses on Compliance to post exposure universal precautions (n = 237).....	104
Table 4.35: The Distribution of Participants responses with regards to Employee Participation on occupational health and safety (n = 237).....	106
Table 4.36: The proportion of the participant’s responses on hospital management and leadership Commitment to occupational safety Policy Guideline	107
Table 4.37: The participants’ opinion on Factor resulting to Poor policy enforcement	108
Table 4.38: Distribution of participants’ responses on whether they are satisfied with the occupational safety practices in their health facility.....	109
Table 4.39: Distribution of Top hospital management responses on safety leadership compliance	110
Table 4.40: Distribution of hazards identification in the hospital.....	111
Table 4.41: The outcome of test association of Health Facility Occupational Safety Responsibility and compliances and other study variables	112

Table 4.42: The multinomial distribution of study variables that influence the health facility safety policy compliance responsibility 114

Table 4.43: Summary of Policy Implementation and Compliance Gap Analysis .. 117

LIST OF FIGURES

Figure 2.1: Conceptual framework of occupational health hazards:	19
Figure 2.2: Factors influencing Safety practices compliance Conceptual explanations,	24
Figure 2.3: Factors influencing workplace hazards	36
Figure: 2.4: Occupational health “cycle of neglect” in developing countries	41
Figure 3.1: The Map of Kigali City showing the three Districts	44
Figure 4.1: The study participants educational background characteristics	60
Figure.4.2: The study participants Professional categories (n = 237).....	62
Figure 4.3: The study participants’ response with regard to number of hours worked per week.....	63
Figure 4.4: The respondent level of knowledge of occupational health and safety in workplace.....	64

LIST OF APPENDICES

Appendix I: Consent Form for Interview of Participants	165
Appendix II: Questionnaire	167
Appendix III: Ethical Approval to conduct Research	193
Appendix IV: Authorization Letter to Conduct Research	195
Appendix V: Approval Letter from Ministry of Education Rwanda	196

ABBREVIATIONS AND ACRONYMS

EU:	European Union
EUOSHA:	European Agency for Safety and Health at Work
EWCO:	European Working Conditions Observatory
EWCS:	European Working Conditions Survey
GDP:	Gross Domestic Product
GNP:	Gross National Product
HCP:	Hazard control program
HCWs:	Health care workers
ILO:	International Labour Organization
O H H:	Occupational health hazards
OECD:	Organization for Economic Co-operation and Development
OEL:	Occupational exposure limits
OH:	Occupational Hazards
OH:	Occupational Health
OHSAS:	Occupational Health and Safety Assessment Series
OR:	Odds ratios
OSH:	Occupational Safety and Health
OSHA:	Occupational safety and health administration

OSHA;	Occupational Safety and Health Authority
PPE & SD:	Personal Protective Equipment's, Standard Deviation
SPSS:	Statistical Package for Social Sciences
W P:	Work practices
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Compliance with Occupational safety standards: adherence during practices to set Public health internationally approved guide lines for workplace procedures that would prevent occupational hazards (NIOSH, 2009).

Hazard control program: They are measures designed to help reduce and eliminate workplace hazards through safety standards, insurance programs, training of workers and continuous work supervision and monitoring. Workplace hazard control and safety legislation, policy and existence of other precautionary measures could be effective in preventing injuries or accidents in workplace. Example of hazard control measure, removal or substitution of hazardous materials, also engineering control through improvement in designs of equipment, administrative control (policies, timing and work regulations, training, provision of safety equipment's', emergency preparedness and good administration (Cole, 2009).

Hazards: Are dangerous objects, events, behaviour and condition or situations that could interfere with the accepted normal orderly progress of an activity or pathway to activities. It might otherwise be said to be dangerous situation and activities that could harm or lead to adverse consequences when working under certain work condition. At times, hazards could be likened to situations that could contribute to actual harm. These hazards could be categorized into biological (bacteria, viruses, insects, plants etc.), Chemicals, ergonomics, physical, psychosocial (stress,

violence) and equipment's breakdown (Siegel *et al.* 2007).

Health effect (injury, illness and disability): as a consequence of exposure to hazards and risks in workplace, might manifest in distortion to normal physiological and anatomic structure of the body or disturbances in mental condition and reduction in life span. Health effect and consequences from workplace hazards could be acute and are felt immediately or might be delayed like cancer that took time to manifest. Also, the hazards could be controlled, but the consequences in most cases are irreversible (Salud. 2009; Matsiko, 2010).

Occupational disease: Diseases related to particular occupation or illnesses known to have arisen out of the exposure to substances and dangerous conditions in workplace, diseases like tuberculosis, bronchitis, asthma, pneumonia, dysentery, HIV, hepatitis, etc. (NIOSH, 2009)

Occupational health hazards: Health risks or dangers that workers are exposed to in their workplace which could endanger their life and poses greater threat to their safety. The harm or health effect, if not eliminated or intercepted could lead to sickness, injury and disability. Sources of workplace hazards; like exposure to pollution, noise, vibration, practices and conditions that could lead to release of uncontrolled energy, falling objects, spilling of chemicals, intense pressure, high temperature, e. t. c. (Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997).

Occupational Health:	Occupational health entails measures taken to promote and maintain optimum physical, mental and social wellbeing of the generality of workers in various workplaces. These measure may include risk reduction, preventive and work adaptation (ILO Sep 25, 2001 www.agius.com www.agius.com/hew/resource/ohsilo.htm)
Risks:	These are the probability that during a period of activity that a hazard would occur and with delineable consequences. Work conditions, behaviours, life styles and situations with high vulnerability and experiences that might lead to adverse health effect or situation with greater tendency to property and equipment damage. Exposure to hazards in workplace have great consequences if not controlled or prevented, therefore it demand constant surveillance and identification (Siegel <i>et al</i> , 2007).
Safety Standards;	These are Specifications, codes of practices or code of conduct developed by a recognized standard setting organization to safe guard workers.
Work Environment:	Physical location, equipment, materials, processes used and the kinds of operations performed in the course of an employee's work.
Work Place:	A building or part of the building where one or more employee carry out the task they are assigned to.
Work Practices:	it includes all activities performed based on organizational goal and standard operating procedures, education and training to ensure good work practices in a good environment and minimize the risk of exposure.

Regular access to safety information and best practice rules and regulation are vital in preventing workplace health hazards (Osuala, 2007).

ABSTRACT

Health facility is among the workplace that contain most hazardous wastes which demands strict compliance to occupational safety and health standards. Occupational exposure to health risks is very common especially with regards to health threats from emerging diseases and health issues, this is further worsened by poor economy and hazards mitigation strategies in health facilities, work overload, growing disease burden and lack of job motivation. The current study was carried out in districts health facilities (Kibagabaga in Gasabo District, Muhima in Nyarugenge District and Masaka in Kicukiro District) in Kigali City, Rwanda. The study adopted a cross sectional design involving both qualitative and quantitative data collection approaches. The study was carried out in Kigali from July 2016 to December 2016, among the health care workers in the three District health facilities in Kigali. The objective was to assess the determinants of occupational hazards and health outcomes, waste management practices and compliance to safety measures in the three hospitals. From the study population of total of 631 consisting of various cadres of health workers, 249 participants were selected using systematic sampling technique, adopting probability proportional to size approach in allocating sample units per cadre. While simple random sampling technique was used to select the study participants for the study. Data were collected using semi structured questionnaire and interview / focus group guides. In addition, an observational checklist was used and policy documents for safety in the workplace were reviewed and to identify gap in the compliance and enforcement. Validity and Reliability of the study instrument ensured through pretesting and adjustment of data collection tool. A final reliability test scale of 7.2 was achieved. Data was analysed using simple proportion percentages, confidence interval and chi-square test of association between study variables statistically significant at 0.05 and lastly multinomial regression analysis was carried out. Study findings: The most prevalent proportion of occupational hazards cases was highest result: working accidents which account to 133 (56.1%, 95% C.I. = 49.55 – 62.54), Next is Slips and falls about 82 (34.6%, 95% C.I. = 28.56 – 41.03) and Injury with Blood borne pathogen about 78 (32.9%, 95% C.I. = 26.97 – 39.29). Three variables was identified as influencing variables to hazards cases through multinomial regression analysis; the respondents' professional categories (medical group) with (p- value = 0.016 < 0.05), Poor safety measures with (p- value = 0.022 < 0.05) and Poor hospital hazards Elimination and control measures with (p- value = 0.002 < 0.05). The most prevalent proportion of occupational hazards health outcomes are Backache 142 (60%, 95% C.I. = 53.37 – 66.21) and Lung Disease 50 (21.1%, 95% C.I. = 16.08 – 26.85) respectively. About four variables influences hazards health outcomes cases through multinomial regression analysis in the study; hospital safety compliance responsibility (p –value 0.004>0.05), pre and post exposure safety practices (p –value 0.015>0.05) and workers participation in hospital safety program (p –value 0.043>0.05), Factors that are associated with Human level occupational hazards and health outcomes determinant factors in multinomial regression analysis showed: institutional associated factors with (p- value = 0.00 < 0.05), Safety measures opinion among health care workers with (p- value = 0.00 < 0.05), Practices of post exposure safety

compliance with (p- value = 0.047 < 0.05) and Masaka health facility with (p- value = 0.005 < 0.05). Furthermore, institution factors were influenced by; Hospital safety policy compliance (p- value = 0.05 < 0.05), Safety practices with (p- value = 0.01 < 0.05), Workers participation in safety programs (p- value = 0.005 < 0.05) and Human level factors (p- value = 0.000 < 0.05 through multinomial regression analysis. The health facility waste management practices are influenced according to the multinomial regression analysis by; hospital policy compliance responsibility commitment (p- value = .001 < 0.05) and Human related factors (p- value = .045 < 0.05), Institution problems (p- value = 0.03 < 0.05) and the health facility strategies for elimination of hazards significant (p- value = .009 < 0.05). The hospital waste management program on inspection showed no evidence of medical waste reduction facility plan, developed rules on recovery and disposal of the waste. Findings from Compliance to safety regulations showed five variables on multinomial regression analysis: Actions that Influence poor policy (p- value = .004 < 0.05), Health facility waste practices (p- value = .002 < 0.05), Hospital management safety practices (p- value = .003 < 0.05), Health facility safety programs (p- value = .022 < 0.05) and workers participation in safety program (p- value = .042 < 0.05). Policy Gap Analysis showed: health facility accreditation system is adopted to improve quality of care. There were evidence of poor compliance to incident investigations; report and follow up, training gap and absence of statistical records of hazards and health outcomes. The focus group discussions are in support of most statistical findings in the study. Therefore, the government, health care workers and hospital administrators need to strongly address the gaps in policy, re-structuring and other corrective measures in occupational hazards and safety as a way forward.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Health workers are the bedrock for sustainable social and economic development of any giving society at both local and global level and they play vital role to functioning of a given health system. The majority of the health workers provide health care services to the consumers, while the other staff carryout administrative duties and the paramedical or allied staff are the supporting staff. But the unfortunate fact is that, these workers while carrying out there job are exposed to wide range of harmful and hazardous substances which could cause illness and injuries. In most cases focus are on the care consumers rather than the care giver (Adamu & Abdulahi2017).

The most effective way to control these health hazards among Hospital workers is to comply with occupational health and safety standards in hospital and make safety as a prime priority. Moreover, poor safety awareness, training and poor acceptance to safety practice may worsen the situation even more (Melissa, 2014; Orme et al 2014)

The level of hospital safety climate and safe working environment largely depend on legislation and compliance level of occupational safety policy and inspection of workplace environment to ensure practice of health and safety standard. The common health hazards found in health facilities are physical, biological, chemical, thermal, toxic and stress related problems. Prolonged standing or sitting may cause a lot of strain; injury may result from working accident, or falls. Health care workers health and safety is vital ingredient to healthy and productive society (Mehraj et al., 2011; Arocena, Nune & Villanueva, 2008)

It is increasingly recognized that health workers are subject to a variety of health hazards. Several studies have indicated the need to identify major critical area that have more likelihood of causing hazards, as well as strategies to avoid them, so that the health of these workers are not affected. The sustainability of health care system

and productive outcome depends on the maintenance workers health, working capacity, safe working environment and the development of work organization and culture (Joan, 2010; Annalee *et al.*, 2007).

Occupational exposure to health risks is common in the developing world especially in relation to work overload, lack of task control and role ambiguity. There are other factors including poor organization, unfair management practices, human and economic factors. Various studies carried out among different categories of health care workers, found exposure to blood or other body fluids common among the occupational hazards in health institutions due to higher exposure rate. Several other factors includes, personal behavioural factors and organizational managerial factors, were found to be largely responsible for some of the reason people are suffering health hazards (Annalee *et al.*, 2007; Jawaid *et al.*, 2009).

Although there are both informal and formal health information's on protection mechanisms against hazards in Africa, the focus tends to be more on curative rather than preventive in nature. While such curative protections are of course hugely important, they are equally important to think, within the social protection paradigm, about institutions and mechanisms which work to prevent illness and injury from occurring. These are particularly so when it comes to the workplace because they are where most personnel spend a significant proportion of their time (Houtman *et al.*, 2007; NIOSH, 2009).

Enforcement and organizational trust through regular supervision and provision of safety devices and training are more likely to reduce health risks in work place, if effectively and judiciously carried out on regular basis in workplace. But in reality, the cases are different. This calls for closer examination and investigation. Also if sanctions are given to workers for non- compliance and engaging in high-risk behaviour, it would serve as a deterrent to others who do not believe that their employing organizations are concerned with their safety. Workers that believed that management are committed to employee safety and health are less likely to take risks and more likely to adhere to the employer's safety contract (Ford & Tetrick, 2011; Hambach *et al.*, 2011).

Workers employed by an organization with a positive safety culture and works in an environment with strict instructions on safe work procedures and commitment to safety measures would not have hazards unlike those the organization does not mind safety culture of employee. In a study, Garcia et al. (2004), he found that workers exposed themselves to more risks and were less likely to comply with safety rules when they rated the safety climate of their organization poorly.

In addition to trusting that there would be consequences for behaving unsafely, workers need to have faith in the credibility of those communicating safety messages in order to take proper precautions when working. Employees also needed to trust that the organization provides reliable and relevant safety information in order to access and use that knowledge. Perceiving that safety information's are not readily available is associated with lower safety efficacy and lower levels of compliance (Real, 2008). In workplaces, new employees may start taking unsafe shortcuts while performing job tasks because other more seasoned employees are doing so.

According to recent ILO (2008) estimates, the global number of work-hazards does not seem to have changed significantly during the past 10 years. These are mainly driven by the globalization process and by rapid industrialization in relatively poor countries that are not capable of maintaining effective OSH systems. It has therefore been argued that the need to focus on health and safety are paramount as ever, given that "the traditional hazard and risk prevention and control tools are still effective but needed to be completed by strategies designed to address the consequences of a continuous adaptation to a rapidly changing world of work

Healthcare professionals, especially those working in surgical services, environmental services and sterile processing, are exposed to a significant number of chemicals including those used to clean and disinfect the healthcare environment and those used to disinfect and sterilize surgical instruments and medical device. Other hazards include blood-borne pathogen transmissions caused by sharps injuries, as well as respiratory dangers associated with the inhalation of surgical smoke and other particulates (Brunner & Suddarths, 2007).

Certain studies have suggested that signs of intense mental fatigue are slightly more frequent among health workers in higher positions that are faced with decision challenges, so it may possibly be due to workloads (CDC, 2012). Other studies showed the allied health personnel's are more exposed to excessive physical workloads, (Annalee *et al*, 2007). Health workers are adversely affected by biological, physical, chemical, and psychosocial occupational hazards they face in their work place. In spite of global, national, regional, and local initiatives to develop a skilled health workforce to deliver better health outcomes, efforts to reduce OSH risks for health workers in developing countries are far from sufficient to protect their health. Particularly for developing countries facing a health workforce shortage, saving lives should not be accomplished by sacrificing providers' own lives. Without healthy, well-prepared, motivated workers, the Millennium Development Goals for health cannot be achieved (PPE, 2012).

The need for up-to-date information on occupational hazards and health outcomes and the associated factors among the health care workers in Sub Saharan Africa are of critical importance for the purposes of identifying areas of required action and for setting priorities for policy initiatives on improving health and safety at work, especially in sub- Saharan African that are faced with emerging infectious diseases epidemics.

1.2. Statement of Problem

The international labour organization (ILO) findings revealed that work-related diseases and accidents account for economic losses are as high as 4% of worldwide GDP (ILO, 2003). Healthcare workers operate in an environment that is considered to be one of the most hazardous occupational settings; they equally encounter diverse hazards due to their work related activities (Andersen *et al*,2012). Occupational health interventions in some countries especially Africa formed focal current issues. In 2007, the World Health Organization (WHO) endorsed the global plan of action on workers' health 2008–2017 with the name of Sixtieth World Health Assembly (WHA): and urged member states to work hard towards full coverage especially the

underserved, workers in informal sectors, small and medium-sized enterprises, agriculture, migrant, and contractual workers.

Health workers are exposed to hazards as a result of inadequate safety knowledge, or handling medical equipment or neglecting to follow simple procedure in accomplishing task or management may not provide the right safety standards and resources for employees. Poor health and safety practices lead to illness, accidents and significant cost to the organization. Unsafe and unhealthy working conditions affect service delivery quality and health worker productivity and retention. The nature of health care work, handling patients or investigating client's illness condition, makes it absolutely vital that health and safety are priority. The extent to which health organizations allocate their limited resources towards occupational health and safety interventions (OHS interventions), including both worksite health promotion and health and safety interventions, are driven by some combination of legal, financial, and moral factors (Adema & Ladaique, 2009).

Study on occupational health hazards among health workers conducted by Ndejjo *et al.* (2015) in Uganda; showed an increased number of cases of occupational hazards and major gap in mitigation measures. A cross sectional survey, (KURT *et al.* 2010) found that majority of health care workers was aware of policies and procedures for reporting accidents. Splashes from body fluids, needle stick injuries and cuts from other objects were quite prevalent among health care workers. Also the study made by Manyele, Ngonyani, and Eliakimu, (2008) in Tanzania showed that hazardous activities were carried out by nurses and attendants, Chemicals uses caused skin burns during handling, injection, cleaning, patient care, bedding, dressing of wounds, medication and surgical operation.

A study done in Rwanda by Makanga *et al.* (2008), on HIV/AIDS among Surgical Patients in Butare University Teaching Hospital, revealed prevalence of 6.6%, HIV/AIDS as a real and significant problem in surgical practice and patients with HIV admitted to a surgical department require special consideration if their surgical management is to be effective.

Also, Iyamuremye and Brysiewicz (2010), tries to explore secondary traumatic stress in mental health nurses working in Kigali, Rwanda, study result indicated that majority of respondents' had a high T-score (extremely high risks). Another study on perceived disability and contributing risk factors to work-related low back pain amongst nurses in Rwanda, findings showed that Disability Index demonstrated a mild to moderate disability due to work related low back pain in this group of nurses Ndagijimana, (2011).

The present study is essential in providing information that could contribute to the occupational safety and health in the three district health facilities (Muhima, Kibagaba and kicukiro) in Kigali, by supplying information on the prevalence rate of occupational health hazards in the health facilities. It would further generate information on the mitigation strategies gaps which could be used for policy adjustment and to analyzing the effects of program on safety performances.

1.3. Justification for study

Workers in the health facility are constantly exposed to disease provoking pathogens especially blood borne pathogens in contaminated formites, radioactive toxic wastes. Occupational safety health adherence helps to prevent risk of illness and death associated with unusual exposure. Unfortunately, in most Sub Saharan African Countries, there are problem of fewer health workers, this has led to over use of the work force, this condition is even worsened by shortage of surgical and other hazards prevention equipments especially in some high risk section of the health facility (operating theatre, trauma unit, emergency unit, obstetrics to mention a few).

Recently, health care workers are experiencing increasing work related stress from work overload and work pressure and this has at time while trying to meet with work demand has made the vulnerable of needle stick injuries and cuts. Some of them while trying to lift some heavy patient experiences pain or sprain. This have rapidly increased the number of sickness among them and impact on job outcome. This condition is also worsened by the neglect of occupational health and safety of health care workers. But more worrisome is the absence of data or record of incidence of case of commonly encountered health hazards and follow up management based

occupational safety law. The record and reporting behaviour are other major issue in Rwanda. Understanding the predisposing factors for occupational hazards among healthcare workers is vital too.

Rwanda among other developing countries has not developed a good surveillance system for occupational exposure to health hazards in health institutions, hence limiting estimation of the exact magnitude of such hazards. There are little information on rate of compliance with universal precautions among health care workers especially in high risk sections, occupational risk are even higher due to harsher working conditions, greater isolation and insecurity, poorer infrastructure, inadequate equipment, and work overload (Matsiko, 2010),

Due to the demand for effectiveness of care, for decision making in health setting and for policy adjustment and other stringent measures to help unburden Rwandan health sector in area of occupational hazards and safety issues. Development of standards and guidelines and the need for cost containment, health services research has become much more prominent in recent years. There were few published empirical studies on the work in OHS in this part of the continent. Result of the study will generate more insight on gap that exists in meeting the occupational safety of health personnel in Rwanda. Findings from this study and the methodology would be useful literature for other researchers following the publication to fill the existing gap.

1.4 Research Questions

1. What are the types of occupational hazards and health outcomes that the health workers are exposed to in the health facilities in Kigali?
2. What are the proportions of health care workers that are exposed to occupational health hazards and the health outcomes in the health facilities Kigali Rwanda?
3. What are the medical waste management practices in the three selected health facilities in Kigali, Rwanda?
4. What are the human factors influencing occupational health hazards among the health care workers in the three selected health facilities in Kigali?
5. What are the institutional factors influencing occupational health hazards among the health care workers in the three selected health facilities in Kigali?
6. What are the compliances to safety standards adopted by the hospital management and the health care workers for the protection of health workers based on policy guidelines in hospitals?

1.4. 1 Broad Objective

To determine the occupational health hazards, the associated factors and compliance to occupational safety measures in three selected health facilities in Kigali, Rwanda.

1.4. 2. Specific Objectives

1. To determine the types of occupational hazards and health outcomes that the health workers are exposed to in the health facilities in Kigali
2. To determine the proportion of health care workers that are exposed occupational health hazards and the health outcomes in the health facilities Kigali Rwanda
3. To determine the medical waste management practices in the health facilities in Kigali, Rwanda.
4. To determine the human factors influencing occupational health hazards among the health care workers in the health facilities in Kigali;

5. To determine the institutional factors influencing occupational health hazards among the health care workers in the health facilities in Kigali;
6. To determine the compliances to safety standards adopted by the hospital management and the health care workers for the protection of health workers based on policy guidelines in hospitals.

CHAPTER TWO

LITERATUR REVIEW

2.1. Concept of Occupational health hazard

In this section, a critical review of the issues connected to occupational health hazards are explored through conceptual, theoretically and empirically in line with the specific study objectives in order to identify the knowledge gaps in the existing research studies. Occupational safety health constitutes an area of lively discourse across disciplines, but Complementarities in the methodological or empirical findings have not yet been brought together. The determinants of occupational health are multifaceted there are great need for further collaboration among researchers of different disciplines on issues related to OSH. Conformity to safety regulations entails compliance and obedience based on strong influences which might be diverse and varied (Kassin, Fein, & Markus 2011).

This study explores the available medical, psychological, sociological and economic literatures on the determinants and implications of OSH for individual workers, economies and societies. Moreover, provides a useful guide to other researchers in investigating issues, related to health and safety by employing an integrative analysis. In addition, it serves as a useful source for the interested reader on information on the issue of OSH, in both academic journals and official reports commissioned by major public bodies (such as the WHO, the ILO and the EU). It equally explores the response strategies and consequences on the health personnel and some of the theoretical / empirical frameworks that are employed by researchers in order to analyze issues of health and safety and to inform public policy.

Throughout history workplace hazards and occupational medicine have been shaped by the forces that shape work itself, social evolution, changing modes of production, shifting economic powers, and demographic changes in the workforce. These changes are not unique to the present time; it has always been in existence. Hippocrates emphasized the relation between environment (air and water) and health. The impact of work on health could be traced to the Edwin Smith Surgical Papyrus,

written approximately 1700 BC. The earliest occupational physicians served military forces, and Galen was physician to Roman gladiators. Finger and wrist guards worn by Bronze Age archers represent early personal protective equipment.

Healthcare personnel's are exposed to chemical, physical, psychological and biological agents or patients' body fluids and supplies used for patient care as part of their job especially the physicians, nurses, occupational therapists, pharmacist, as well as auxiliary workers and laboratory staff in medical facilities. The implication of these are the need for all healthcare workers to be trained on basic infection control regardless of whether they deliver direct care to patients (Siegel *et al*, 2007). The workplace environments have substances with positive and negative influences, the place where most adults spend a substantial fraction of their time. Also optimum work place temperature and humidity are necessary to provide thermal comfort in cold weather. In like manner adequate ventilation and air movement enhances productivity and reduces risk of airborne cross infection. Important in working environment is the ergonomics / physical arrangement of work area and equipment (especially, space, lighting, cleanliness,) which allow people to work with comfort and safety.

2.2. Conceptual Framework / Theoretical review

A display of conceptualized framework on the major variables in the hypotheses and framework of relationships between known variables in the problem statement are shown clearly.

Occupational health needs arose in our rapid urbanizing and industrialised society, with evidence of rising threats and unhealthy working conditions. To enhance productivity and enable good wage, health of workers and good working condition are of prime importance and a key motivational factor. Occupational exposure could occur in different ways which include contact (direct and indirect) transmission, droplet transmission, airborne transmission, through the skin and mucus membranes, many pathogens might share more than one exposure route (Eysenck, 2004).

Factors associated with occupational hazards might include:

Agent: Biological chemical and Physical characteristics (e.g. biological, objects, equipment's, vapour pressure, pH level) and Process characteristics.

Ergonomic conditions: Bad ergonomic workstations and other adverse working conditions, such as strenuous work postures, lifting of heavy loads, or repetitive movements during the performance of job tasks could have many adverse consequences on health. Musculoskeletal disorders constitute the most severe manifestation of an unsuitable work environment, and are found to affect a significant portion of the workforce.

Worker characteristics: this include the following; working time arrangements, Job activities or work techniques mobile or stationary and adverse working time arrangements. Also long and irregular workdays (excess of 10 hours per day of 48hours per week) and shift work have detrimental effects on both physical and psychological health of the workers. Working long hours usually are likely to be associated with increased risk of ischemic heart disease and myocardial infarction (Tochikubo, Ikeda, Miyajima, & Ishii, 1996; Liu & Tanaka, 2002; Artazcoz *et al.*, 2007) and hypertension (Nakanishi *et al.*, 2001). Extended work hours might interfere with the diurnal rhythm that results in decreased sleep, thus magnifying the adverse effect of psychical tiredness forthwith (e.g. increased heart rate, elevated blood pressure, lower cortical secretion) in relation to inadequate recuperation (Dahlgren *et al.*, 2006). Similar effects of disturbed biological rhythm are digestive disorders and subsequent physiological disturbances among employees engaged in erratic shifts and night work (Costa, 2003; Bjorvatn *et al.*, 2007). Adverse working time arrangements could be significant determinants of the sickness absence behaviour of workers (Lusinyan & Bonato, 2007), the incidence of workplace injuries (Currington, 1986; Wooden, 1990), musculoskeletal disorders (Wergeland *et al.*, 2003) and of the risk of exhaustion and burnout.

Environmental characteristics: concerns like workplace Indoor and outdoor, temperature, violence might manifests in a number of ways like physical or mental violence or bullying, (sexual/racial) harassment and discrimination. Although the

extent of these phenomenon are likely to be underreported, data from the ESWC indicated that about 2-3% of workers suffer from sexual harassment, and 9% are exposed to bullying and victimization at work with a close associated incidence of physical violence. Some identified adverse health effects associated with workplace violence includes; psychopathologic, psychosomatic and behavioural symptoms (Cassittoet al. 2003).

Social: Work relationship and social atmosphere of the workplace could have some consequences on the worker. Especially atmosphere of constant fear and agitation, if prolonged might upset the psychological wellbeing of workers and affect their work performance and compliance.

Innate characteristics: personal health resources form an important component of the person's response mechanism, for instance, level of immunity, resistance and susceptibility to disease, stress and workplace injuries. Sound Health is multi-component that could demand optimum nutrition, rest, physical and psychological aspects necessary for effective and efficient functioning.

Knowledge: entails training on health safety standards and job activities of techniques in service to ensure expertise in procedures, handling of equipment and proficiency in work activities. Absence of training increases risk and poor compliance to set rule and safety regulations and techniques.

Economic and social implications: lack of health and safety measures at the workplace (impact on GDP or labour market prospects).

Employers Value of life for employees: monetary value that employees place on their lives might contribute to the likelihood of a fatal job accident.

Many work environments contain hazardous substances including chemicals, dust, fumes, biological agents that might be inhaled, absorbed through the skin, splashed into eyes, or are ingested mistakenly. Most common in workplace are injuries that could arise from slips, trips and falls from height. Damaged and poorly repaired safety equipment could cause injury, even routes and un-obstructive exits for safe

movement of people and traffics. Musculoskeletal disorders relating to workplace activities are common, especially from manual handling; heavy lifting might cause repetitive strain injuries. Most electricity deaths are caused by contact with overhead or underground power cables. Non-fatal shocks could cause severe and permanent injury. Radiation risks are usually strictly controlled, but ionizing radiation risks might arise from exposure to x-rays or radio-nuclides e.g. medical imaging, as well as from radon gas from the ground. On the other hand, lack of control over the way work is done might contribute to work overload (or under load); especially from lack of support from managers; conflicting or ambiguous roles; poor relationships with colleagues (including bullying), poor management of organizational change.

Occupational health and safety policy addresses the health, safety, and welfare of workers to help foster a safe work environment, the promotion of physical and mental well-being of workers in all occupations and the prevention of workplace-related injury and illnesses. Policy compliance regulations requires; Management commitment and assignment of safety responsibilities to worker, regular safety communication system, hazard identification and control, incident investigation, safety planning, rules, and work procedures and training.

Workplace safety compliances expectations might include the following; health and safety committees /worker participation, injury and Illness Prevention Program (IIPP), training on hazards and identification of hazards, reducing or eliminating hazards, better regulation of health and safety, effective rest and recovery time, workers' compensation, return to work, Job rotation, adequate breaks, job analysis and workspace redesign.

The Individual factor in Occupational Safety and health

The Occupational safety and health is an individualistic factors which is a reflective of the persons attitudes, beliefs, perception and values placed on safety and hazards prevention .The health facility management attitude and approach to safety and health and towards accident and disease prevention in workplace are shown in the supervisory force, safety regulation enforcement and hazards mitigations strategies put in place and the level of cooperation and employee involvement in safety and participation in safety programs.

The health workers as individual are holistic being with physical, emotional, social, mental and psychological aspects which could be affected when exposed to hazards. Occupational safety and health aimed at promotion and maintenance of optimum degree of physical, mental, psychological and social wellbeing of workers in any given institution. The OSH work to prevent hazards, eliminate workplace risks that may pose threat to the health wellbeing of workers, proper job placement, and maintenance of hazards free environment and creation of stress free atmosphere that allow workers to engage in productive services.

The individual is assumed to be responsible for his own health and wellbeing, he is to invest in knowledge to gain enough information that is necessary for him to attain higher level of safety and health. Safety culture entails an informed culture, where all concerned individual are aware of the human, technology, environment factors that can affect their safety and health in work place. Also important is reporting culture which entails liberty to freely report errors, misses at workplace. It is obvious that safety measures are sometimes not static, but may take different forms as to which to address a specific safety need. The individual willingness and competences to draw right conclusion from safety information and the will to carryout of reforms as the need arises are embedded in learning culture

Training, guidance and supervision are pre requisite for safety and health in workplace. The motivation to perform job in safe manner is a function for individual commitment concern for safety and expressed concern of the management staff for safety, which gave rise to the practices outcome including

compliance to regulations. There are other personal factors that could equally affect safety compliances like personal behaviours and habits but these are not tolerated in workplace under safety regulations

Occupational Health and Safety Training

The OSH training is purposeful effort directed towards helping people to acquire specific knowledge and skills for improve knowledge in operating of equipment, carrying out job procedures, keeping safety regulations and information on risk aversion, containment and elimination. Health and safety training helps in ensuring hazard prevention. An employer is obliged to train workers on health and safety and correct use of equipment. The workplace health and safety committee is responsible to provide advice on health and safety training programmes, examines safety training documents to ensure its adequacy and attend to other training details like logistics, timing, outcome evaluation.

Sometimes safety training are giving as induction course for new workers to help fully orient them to the setting and the expectations. The training is used as a forum to discuss safety rules, information about potential hazards and how to avoid them. The workers during safety training are equally trained on certain routine practices like pre exposure and post exposure to hazards precautionary measures and responsibilities. During the training, the workers are made to know the institution hazards reporting system, hazards investigation procedures and follow up expectations.

Other area of emphasis during training may be in the area of new emerging condition of safety concern and safety responsibilities expected, also to warn them in area or specific job area that have specific threats so that they have safety consciousness while working in that area to avoid unnecessary risks.

The labour code in Rwanda require employer to provide free protective equipment (PPE) like gloves, mask, eye protection goggle, gown special shoe to workers whose work entails some form of hazard which the PPE stand to reduce the risk of exposure to accident and illness. The employer has the mandate to train the workers on the

proper use to avoid contamination and spread of infection (Articles 156-160 of the Law regulating Labour in Rwanda, 2009).

Occupational Health and Safety Inspection and sensitization

Most often based on safety regulations, routine inspection are carried out to ensure that the working environment is safe for workers and that the employers are complying to the safety regulations and workplace practices compliances by workers. The inspection are done using check list to ensure compliance, strict assessment carried out on the all accidents and near misses and report system check. Inspections are usually carried out by specially trained agents of the department of Labour and their activities should follow strict and unbiased procedure and visits are without prior notice.

The inspections are done in this order in most cases:

- They start with situation that involves imminent danger in workplace
- The next thing is to check the incidents resulting to fatalities or hospitalization or disability
- Follow up of employee complaint of unsafe and unhealthy working condition
- High hazard and risk jobs like areas that come into contact with blood / blood product and other body fluids (theatre, laboratory, maternity etc.), areas where workers are exposed to chemical and radioactive wastes.
- Then examine work environment and equipment

Note: information generated would be used for the implementation of reforms as the need arises. The labour inspector informs and advises employers and workers concerning the most effective means of safety regulation compliance. They also need to report all the activities that are in non-compliance with the provision of the labour code and the social security (Articles 156-160 of the Law regulating Labour in Rwanda, 2009).

The health system OSH regulation requirement;

- Occupational health and safety policies

- Safety education and training
- Protective equipment
- Safety representatives and committees
- Recording and maintaining incident data
- Safety roles of employees and employers
- Safe environment and healthy workers

(Articles 156-160; of the Law regulating Labour in Rwanda, 2009).

This is a framework of relationships between known variables that linked the problem statement to the research questions and the theories related to the study.

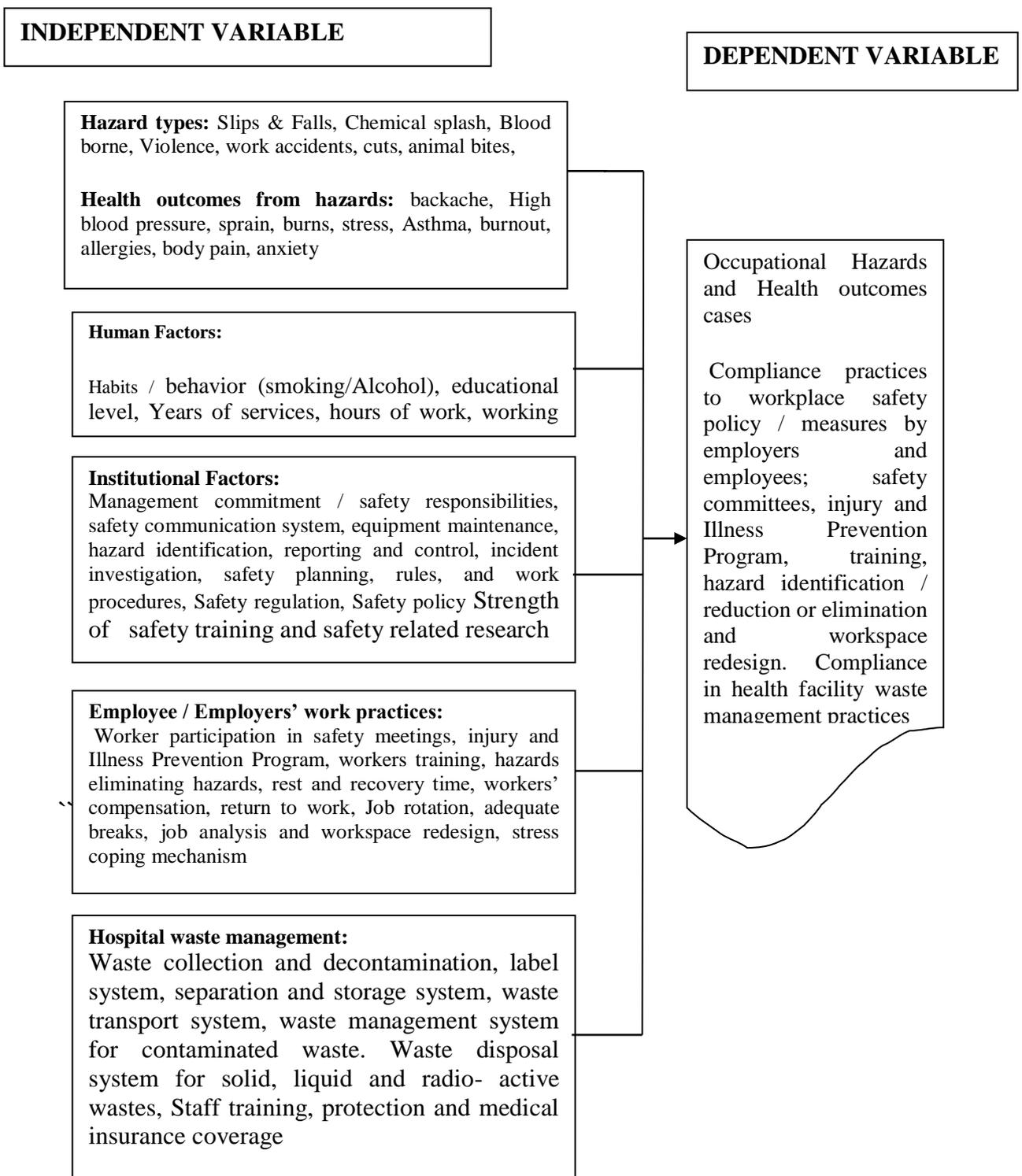


Figure 2.1: Conceptual framework of occupational health hazards:

Source: Author: 2018

Theoretical concept application

The perspectives of this dissertation work are based on the social ecological model. As a general framework, the social ecological framework proposes that outcomes such as behaviour, health and absence of health have multiple influences consisting of individual characteristics and environmental factors. The social ecological model focuses on three main levels of environmental influences that could interact with individual characteristics. The first level revolves around the immediate primary environment dominated by interpersonal interactions, the family, acquaintances and work groups. At the second level, are institutions like family, school and work place? Lastly; are the economic forces, cultural beliefs and societal forces seen in the larger environment (Bronfenbrenner, 1977 in Elmarie, 2006)? Factors within and between levels constantly interacts with each other.

Ecological models, evolved from behavioural sciences and public health, examines the interactions between individuals and their physical and socio-cultural environments. The model implies that individual behaviour is affected by and impacts on the surrounding environment and on social interactions (Mc Leroy *et al.*, 1988; in Elmarie, 2006). In health care setting the institution owners have the mandate to provide the basic safety training and equipment to ensure wellbeing of worker and productive services that are free from hazard. The health care workers have the duty to comply with safety standards and properly handle equipment's to make sure it does not harm them and related others. Certain studies have suggested that intense mental fatigues are slightly more frequent among health worker of senior cadres unlike the technicians or auxiliary workers, and from workloads (Shimizu & Ciampone, 2004). Other studies equally showed that technicians are more exposed to excessive physical care workloads they are constantly engaged in.

Maslow theory of need are of the opinion that an individual are motivated in life by five general needs that contribute greatly to life endeavours, it have two sides; for growth of life skill and adjustment on the other hand, unmet needs might lead to deficiency of life adjustment. Three most common of these needs applied here; the physiologic basic need are necessary for survival especially food, oxygen, shelter.

Next is safety and security in life, including workplace security and safety, to help avoid job stress / insecurity and hazards. Lastly, need for love, belonging and acceptance which are booster for productive services in any given workplace. (Elmarie, 2006)

Also according to stress theory, occupational stress from physical and psychological threats in workplace might contribute to emotional anxiety, anger, violence and aggressive behaviour in workplace, likewise psychological strain and with other behavioural consequences. These

Stressors if not controlled might lead to non-compliance, negligence as stress is very destructive to job commitment. Burnout is another persistent negative work related state with associated physical, psychological features that could provoke distress, reduced efficiency in service, decreased motivation and development of dysfunctional attitudes to work, (Elmarie2006).

2.3. Health Hazards Prevalence rate among the health practitioners in Kigali Rwanda

Assessment of exposure to hazardous substances at the workplace has shown that exposure is rarely constant. In workplaces tasks, activities, work processes, and locations change over time, resulting in occupational exposures that vary both within workers over time and between workers in the same job (Johansson 1995). Exposure parameter in an occupational group present only limited information on the underlying exposure pattern among workers in this occupational group. The phenomenon of exposure variability needs to be understood for a number of purposes, including planning exposure measurements, assigning estimates of exposure to subjects in a study, identifying determinants of exposure, evaluating compliance with exposure limits, and establishing efficiency of control measures (Wilson et al. (2006),

2. 4. Different occupational hazards in workplace

Health workers are exposed to occupational diseases which are illnesses developed from exposure to biological, chemical, physical and psycho- sociological factors that are present in the work environment or are encountered in the course of their employment. However, occupational diseases are preventable through occupation safety health, hazards mitigation and risk reduction or aversion. Occupational medicine are designed to take care of different health outcomes that might affect the workers productivity and reduce disability, absenteeism and enhances the general wellbeing (Encyclopedia Britannica, 2009)

Mechanical Hazards risks; injuries, fall, cuts, abrasions, concussions, contusions. Ergonomic Disorders like muscular and skeletal disorders (MSDs), Cumulative-trauma-Disorders (CTDs). Biological Hazards like bacterial infections that causes Tetanus, Tuberculosis, Gonorrhoea, Virus (Hepatitis, HIV), Protozoan and Parasitic infections including, Malaria, Hookworms, tapeworms, Fungi Tinea-infections, Psittacosis. Chemical Hazards; inhalation, ingestion and skin absorption of Chemical and gaseous gents:

Assessing aspects of the health situation of health workers in general, such as the effect of various pathogenic behaviours (e.g. non- compliance to safety rules, smoking, and lifestyle in work place etc.) and the health consequences. OHS hazards are examined from a broad perspective; it relates workplace hazards with the direct and indirect impact on bodily functions and contributes greatly to measure that are taken towards protecting workers health from specific hazards.

Also occupational hygiene relates OHS activities that focus on the identification, evaluation and control of physical, chemical, and biological hazards (Quinlan *et al.*, 2010).

Meanwhile, it might be good to understand and identify the effects of lack of OSH on the economic activity of individuals and their quality of life. For instance find out the extent work-related injuries or illnesses influences productivity. In like manner, working time lost during a recovery period might also have some consequences for

the stock of human capital and the subsequent earning capabilities (Woock, 2007). On another note, individuals that experience injuries and diseases related to work might face a higher probability of unemployment, experience early exit from the labour market or face increased difficulties to re-enter into a suitable job (Pransky *et al.*, 2005). Newton *et al.* (2007) provides evidence that a significant portion of the labour market work force remains idle following the occurrence of an accident or illness, these individuals do not fit into the same job that they performed prior to the incident. Weil (2001) provides a summary of the aforementioned costs and argues that the empirical estimates to date tend to underestimate their true magnitude since the quantification of all the relevant costs is very difficult in practice.

Some consequences of (Lack of) Health and Safety at Work

Accidents at Work: Gyekye and Salminen (2006) argue that the probability of work-related accidents has its roots in two major causes, first; from the internal or innate dispositional characteristics of workers, secondly; the external causal factors which include factors within the working environment. Dembe *et al.* (2004) made mentioned of the broader social, economic and cultural context.

Occupational Diseases: Indicators of occupational diseases refer to diseases which are approved by the national authorities and therefore suffer from problems of comparability among countries. Musculoskeletal disorders (MSDs) are related to physical, ergonomic and psychosocial factors,

such as vibrations from tools or machinery, painful or tiring positions at work, repetitive motion, carrying or moving heavy loads, working with computers, high work demand and fast pace of work, and other jobs involving physical exertion on the body (Cady *et al.*, 1979; Pickvance, 2005).

Psychosocial health problems: Factors of work organization such as job control, job demand, work pace and hierarchical relations are involved in provoking or aggravating psychosocial health problems, such as stress, anxiety and depression. So the working environment of heat, noise, shift work, and precarious contracts contribute to rising stress levels. Other important determinants of psychosocial health

problems might include high speed work, occurrence of unforeseen interruptions at work, lack of control over working methods, mismatch between skills and workload and burnout. Wege *et al.* (2008) throws more light to work-related stress given the high incidence of stress -related disorders reported around the world.

An emerging theme in the literature is the study of the interaction of physical features of the work environment with other psychosocial elements. Leather *et al.* (2003), further examined the relationship between ambient noise levels and job stress, while Foppa and Noack (1996) show that stress at work is associated with musculoskeletal pain. More research is required to detect the underlying links and causalities associated with stress-related psychosocial problems and the relationship with the work environment.

Sickness Absence: The causes of absenteeism are in general multi-faceted, and are influenced not only by the health status of individuals, but also by the social insurance system, the work environment, biological factors, attitudes and commitment to work, macroeconomic conditions and other social and psychological determinants. (Fenn & Ashby, 2004; Heywood *et al.*, 2008; Pouliakas & Theodoropoulos, 2010)

Institutional factors:

- Psychosocial environment
- Enabling work atmospheres
- Safety equipment provision
- Job placement / Supervision
- Work pressure / burnout

Human factors:

- Workers' health
- Safety Knowledge
- Safety information
- Safety training
- Personal attitude



Figure 2.2: Factors influencing Safety practices compliance Conceptual explanations,

Source: the author; 2018

Behaviour Theory suggests that we behave the way we do because we were reinforced at a young age to do so through rewards and punishments. The environment is the biggest factor in changing behaviour, not will. Behaviour are learned by imitation, observations, beliefs, and expectation; the learners are not passively manipulated by elements in the environment, but could use cognitive processes to learn behaviour; observing and imitating models are a pervasive method of human learning. It was further postulated that in a perfectly competitive labour market an equilibrium wage distribution should arise whereby “matching” of the preferences of workers and firms occurs. Thus, risk-averse workers would take up jobs in firms which provide a safer working environment, whereas less risk-averse workers would be more willing to be employed in jobs in which the marginal cost of safety provision are dearer.

A number of empirical studies (discussed below) confirm the existence of CWDs, thus raising the question about whether government intervention in the form of OSH policies and regulations are likely to distort the efficiency of the incentives provided by competitive markets.

2.5. Mitigation strategies to manage occupational health hazards and emergencies in the workplace.

Risks exist in all work environments, the identification, assessment and control are key strategies in occupational health and safety (OHS) practice. How employees and important employers, recognizes and understands these risks that influences how effectively they are controlled or managed. Understanding of OHS risks by the social group in a specific work environment is based on the understanding of OHS. Note: The employer and employee understanding of OHS risks in the context of the local work environment have been little studies. Additionally, the way a common or a different understanding of OHS risks (local understanding) are related to participation in the identification and control of OHS risks, in particular in SBs given the backdrop of social construction of occupational health risks and the lack of productivity connection are barely understood.

Occupational safety health

The occupational safety and health is concerned with the duty of protecting the safety, health and welfare of people engaged in work. The scope of Rwanda OSH national policy apply to all business enterprises, workers, employers and stakeholders in all occupations and sector of the economy. The policy prescribes the core rights and responsibilities of the employers and workers in promoting OSH for a safer and healthy workplace. Promotes and nurtures safety culture with emphasis on the participation of all and compels the employers to ensure workplace safety through hazards mitigation and enforcement on safety compliance practices. The OSH policy placed responsibility of the cost of workers accidents, injury and diseases in workplace on employers, for medical treatment, compensation and rehabilitation of affected workers.

A lot of people are engaged in one form of job or the other to earn their living, while carrying out these several duties for economic and social benefits, it is good that the workplace and nature of the work done does not in any way impinge on the health of the workers. The work environment and activities are of laden with hazardous and life threaten substances, which calls for the need to mitigate and manage the hazard to ensure safety and promote health and wellbeing of workers (Marmot &Wilkinson, 2006). According to ILO, (2011), about 2.3 million people lose their life from workplace hazards cases and further contributed to absenteeism from work. Globally, concerted effort through policy regulations and other approaches were put forward to address the issue and ensure the safety of workers and enhance productivity.

Safety regulatory standard policy were formed and set at the national, regional and international level as a mandatory requirement by all stakeholders in the employment industry to ensure shared responsibility in enforcing workplace safety and health. The policy rule set at international and national level to establish minimum standard requirement for safety and health protection of workers and with strict compliance (Lekaetal, 2011; ILO, 2011). The enforcement of the OSH laws forms an important part of the policy. The call on the developing countries to develop other strategies that is deemed necessary and would contribute to the promotion and protection of the workers in their workplace.

When talking about occupational health and safety in the health facility, it is concerned with employees' health, safety and welfare as contained in OHS act. This act when applied in the health facility, it mandates the board of public health facility to ensure hazard free and zero risk workplace. The act also stipulates that the workers have the responsibility to care for his health and wellbeing and for others too. The health facilities in every country are on high service demand which weigh on the service deliverers, therefore occupational safety and health is a priority for effective and efficient service delivery. Workplace safety is vital ingredient to dedicated service, quality assurance and quick recovery (Bert, 2011; U.S Labor Department, 2014).

The international labour code of 1994 on occupational health and safety provision in Rwanda on the workers welfare, safety committee and inspection and other related issue in the Act as contained in the national council of labour have been under continuous review. The national OSH

Legislation was enacted with aim to provide national labour standards, job creation and establish private and public sector platforms that contribute to the general wellbeing of Rwanda population. The vision emphasised on the need to have an effective and result oriented public administration that are able to deliver adequate services based on felt needs and with adequate framework. Have a socio – economic environment that provides decent jobs to overcome poverty and with a competitive work force that is transparent and admmissive to other job seekers. (Rwanda OSH National Policy; October, 2014; Rwanda National OSH Profile, 2012).

The occupational safety and health act was enacted to address issues related to hazards in workplace providing regulations and the safety responsibility of the employer in an organization. It contains the prescribed duties for provision of workplace safety through safe system of work, training, maintenance of work environment and risk aversion and risk management. The act focuses on the personal duties making all the stakeholders in public service to assume the responsibility for enforcing OSH.

National council for occupational safety and health have members from the government, employers, representative of the employee and the occupational safety and health expert. They sit and establish legislation on code of practices that would demand strict compliance. This is to help enforce OSH in workplaces through establishment of committee that drives the program in the organization. The specific condition for the committee for each organization are set by the national council especially terms of representation in the committee. The committee meet at specified period to have deliberation on the modalities of operation and have the duty of identifying workplace hazards, develop control measure, carry out incident investigation, follow up and keep record of events. The officer in charge of occupational safety and health in the organization need to meet the job position specification through training and examination, when he met the criteria, he become engaged. He attends to national meetings and updates the institution of events. (Rwanda OSH National Policy, October 2014 and Rwanda National OSH Profile 2012).

Rwanda national policy on occupational safety and health guiding principles

- i. Universal coverage – OSH legislation must cover workers and employers in all sectors of the economy and in all forms of employment relationship
- ii. Universal application of core rights and duties – the core rights and duties of employers and workers in relation to OSH must be spelt out in regulation
- iii. Prioritization of prevention and the promotion of a culture of prevention – all accidents and health incidents that are preventable.
- iv. Appropriate and fair compensation and rehabilitation benefits – the provision of meaningful, accessible and equitable compensation and rehabilitation to workers in all sectors of the economy and in all forms of employment relationship.
- v. Application of the “polluter pays” principle – employers bears the cost of accidents and disease in their workplaces, including the cost of most treatment, compensation and rehabilitation (Rwanda OSH National Policy October 2014 and Rwanda National OSH Profile 2012).

OSH Inspection strategies

Inspection is among the approaches designed to overcome challenges to compliance with OSH legislation by the government in workplace through the following actions:

- i. Improving coordination among public interdepartmental inspectors
- ii. Developing responsibilities of OSH inspectors
- iii. Establishing OSH inspectors at District level
- iv. Developing prevention – oriented services – advice backed up with sanctions
- v. Developing the use of professional procedures for targeted enterprises
- vi. Publishing Annual Report on inspection and results and analyses indicating the level of compliance in the implementation of OSH
- vii. Stocktaking of OSH inspectors, improving their quality and quantity at National and District levels inspectors function as OSH inspectors, partners and tutors in compliance (Rwanda OSH National Policy October 2014 and Rwanda National OSH Profile 2012)

The National Legislation Framework

Occupational safety and health being a cross – cutting issue necessary for national economic and social development, the OSH builds on other existing policy frameworks. Like the health sector policy of 2005, the policy governing standards for health services of 2009, national policy for community health of 2008, and the national policy to fight against HIV /AIDS of 2005. Others are national nutrition policy of 2005, policy on community based health insurance of 2004, the national policy on Reproductive health of 2003, to mention a few.

The national government of Rwanda has put in place the national legislation framework promoting occupational safety and health at workplaces:

- a. Rwandan Constitution of 2003 as amended to date in its article 49 that determines that every citizen is entitled to a healthy and satisfying OSH.
- b. Law no 13/2009 of 27/05/2009 regulating labour in Rwanda in its article 90,92,93,94,95 and 96, on health and safety at workplace

- c. Law 86/2013 of 11/09/2013 establishing the General statutes for Public Services in its articles 64, 65, 66,67,69,70 and especially article 68 provides for health and safety at workplace.
- d. Decree law of 22nd August on the organization of social security as modified and complemented by law no, 06/2003 of 22/03/2003 especially in its articles 13, 14 and 20.
- e. Law n° 37/2008 of 11/08/2008 on mining and quarry exploitation.
- f. Law n° 47/2012 of 14/01/2013 relating to regulation and inspection of food and pharmaceuticals
- g. Law n° 24/2012 of 15/06/2012 relating to planning of land use and development in Rwanda
- h. Organic law no 01/2012/OL of 02/05/2012 instituting the penal code;
- i. Ordinance no 41/291 of September 1955 on exploitation of Hotels, Restaurants, Guest houses and Bars;
- j. Prime minister's order no. 125/03 of 25/10/2010 determining the Mission, Organization and Functioning of the National Labour Council especially in its article 3;
- k. Ministerial Order no. 07 of 13/07/2010 determining the modalities of the functioning of the Labour Inspector especially in its articles 3 and 7;
- l. Ministerial Order no.02 of 17/05/2012 determining conditions for occupational Safety and Health;
- m. Ministerial Order no.01 of 17/05/2012 determining the modalities of establishing and functioning of Occupational Safety and Committees especially in its articles 3, 10, 11, 12 and 13;
- n. Rwanda Building Control Regulations, May 2012'
- o. Basic housing Construction instructions for protection against natural and manmade disasters in rural areas, October, 2012. (Articles 156-160 of the Law regulating Labour in Rwanda, 2009 and Rwanda OSH National Policy October 2014 and Rwanda National OSH Profile 2012)

OSH Activities responsibilities in sectors

The following institutions shall have specific OSH responsibilities as specified below:

- i. The Ministry in charge of labour will continue to coordinate and guide the implementation of programs and activities related to Occupational Safety and Health.
- ii. The Ministry in charge of health will ensure that OSH is taken into consideration in Health Laws and Policies and develop OSH regulations for Health Sector. It also has the responsibility of qualifying Occupational accidents, diseases and fatalities and raising awareness on OSH among Health sector workers and the population at large.
- iii. The Ministry in charge of Natural Resources will ensure that OSH is integrated in Mining Laws and Policies and develop OSH regulations for Mining and Quarrying Sector. It will also raise awareness on OSH among Mining and Quarrying Sector workers.
- iv. The Ministry of infrastructures has the responsibility of ensuring that OSH is mainstreamed into Laws and Policies governing Transport, Energy and Construction and develop OSH regulations for Transport, Energy and Construction Sectors. It will also ensure awareness raising among its workers
- v. The Ministry in charge of Industry and Trade will also ensure that OSH is maintained into Laws and Policies governing Industry and Trade and develop OSH regulations for Industry and Trade as well as Hospitality Sectors.
- vi. The Ministry of Agriculture will ensure that OSH is integrated into Laws and Policies governing Agriculture and develop OSH regulations for Agriculture Sector. It will also have the responsibility of raising awareness on OSH among Agriculture Sector workers.
- vii. The Ministry in charge of Disaster Management will ensure that OSH is taken into consideration Laws and Policies governing Disaster Management and develop OSH regulations for Disaster Management.

- viii. The Ministry in charge of Justice will have a lead role in ensuring consistent application of OSH governing laws and promote development and application of protective and preventive legislations.
- ix. The National Labour Council will continue to advocate and advice on Occupational Safety and Health Legislations and Policies (Rwanda OSH National Policy October 2014 and Rwanda National OSH Profile 2012)

Government Policy regulations guidelines on OSH in Rwanda health Sector

- a. The employers' duties and responsibilities to protect the health and safety of their workers. To ensure sound health and safety of their employees and people other than their employees and have good relationship and collaboration with other employers working with them. Also have continuous surveillance of work place safety and health of workers, work environment and work practices. Provide personal protective equipment; ensure regular and correct use of the equipment through training so as to ensure the workers are protected against hazards. Among other duties are to provide first aid via emergency box and medical care, installation of fire response mechanism, sanitation system and welfare facilities like drinking water and resting and eating place.
- b. The duty to organize prevention mechanism officially based OSH management principles and practices. Have policy with assigned responsibilities for health and safety and with a trained professional officially assigned to be in charge of health and safety. Develop specific safety rules and regulations practice guide in a comprehensible language and adapted to different settings. Ensure procedure manual and staff training on risk aversion and assessment of hazards prevention strategies as well as employee evaluation.
- c. Have a professional and an expert fully trained to handle all the issues related to workers safety and health.
- d. The employees' right and duties; they should take active step to protect themselves and others through risk avoidance and declare to the colleagues any impending danger or threat at work. To take reasonable step to protect

themselves and others at work who is being supervised or workers working under them. And regularly comply with safety regulations, seek information on risk and hazards mitigation strategies or with draw them from danger and be assigned to no hazardous task.

- e. Specific categories of hazards and risks in workplace; biological hazards, chemical, ergonomic, physical, psychosocial and other hazardous substances like machineries and equipment's.
- f. Policy provision for the protection of workers in certain vulnerable conditions like the pregnancy at workplace and lactating women at work
- g. The hazard, accident and disease incident recording, notification and investigations to determine causes. The employers' duty to report back to the OSH authorities morbidity and mortality cases of injury.
- h. Have experts assigned with inspection and enforcement of the OSH legislation and application of sanctions by court to defaulters

Some of the Response strategies designed include:

Occupational safety and health (OSH) Infrastructure: The extent to which enterprises and States comply with and seek to enforce OSH regulations (e.g. the number of binding and non-binding OSH regulations that are ratified; the number of / proportion of workforce covered by OSH inspections) (ILO, 2006) also Investment in OSH prevention activities by both enterprises and national authorities, such as steps or measures taken to prevent or reduce occupational risks and to protect the health and safety of employees.

Social Security Expenditure on OSH: Adema and Ladaique (2009) reports showed that according to the OECD Social Expenditure Database (SOCX), gross public social expenditure on average across the OECD increased from 16% of GDP in 1980 to 21% in 2005, with public pensions (7% of GDP) and public health expenditure (6% of GDP) constituting the largest items

Occupational safety health (OSH) Regulations: discrepancies exists in the OSH laws and regulations of various countries, especially with respect to the criteria required for the receipt of sickness / disability benefits, the duration of benefit

provision and the magnitude of social insurance compensation. The ILO has a central role in providing recommendations and guidance for national OSH policies, it publishes instruments showing varying levels of obligations for member countries. These instruments are ratified before decision for implementation takes place. The recommendations are for national governments to implement or use as a guiding policy. A number of studies investigate the factors that underlie the decision to ratify and adopt OSH-related ILO conventions. The length of ILO membership, national income status and regional affiliation are shown to be associated with a higher number of ratifications by member states (Wilson *et al.*, 2006). Horny *et al.*, (2009) spoke on developing countries, for which OSH are seldom given priority status due to financial constraints. They employ an empirical methodology that allows for the fact that ratification behaviours that are influenced by unobserved characteristics both of countries and of different conventions.

Occupational safety health (OSH) Prevention: A number of papers show that firms that took more proactive stand toward the development of a comprehensive workplace risk prevention system are more likely to have lower accident rates than those that follow the minimum legal requirements. Hunt and Habeck (1993) examined a sample of 220 firms in the US State of Michigan to establish the relationship between certain workplace risk prevention parameters and indices for the frequency and severity of accidents. The study suggests that the institutions needed to generate and process internal information, investigate accidents and incidents fully, foster programme for emergence of a “prevention culture”. Promote programmes to enhance workplace ergonomics health promotion measures like ergonomic management, anti-smoking campaigns, purchase of personal protection equipment, stress management seminars, nutritional awareness as a comprehensive and ongoing manner. Furthermore, in a study in Spain, Arocena *et al.* (2008) construct a risk prevention index that quantifies the intensity of preventive effort by the institution, using a sample of 213 industrial firms. These measures are based on questions regarding six preventive dimensions, such as Measures designed to eliminate risk at source, Training of workers, Communication and workers’ participation, Risk control measure, Actions taken in view of foreseeable changes, Documentation and Emergency prevention, preparedness and response.

The provision of OSH training to employees constitutes an additional strong preventative action; that are associated with reduced workplace injuries and disease. In a wide-ranging literature review of published reports drawn from the period 1980 to 1996, Cohen and Colligan (1998) found overwhelming evidence that showed the merits of training contributing to increasing worker knowledge of job hazards, and in effecting safer work practices and other positive actions in a wide array of worksites. The study shows that factors such as the size of the training group, the length /frequency of training, the method of instruction, the trainer credentials, and other extra -training factors (e.g. goal setting, feedback, motivational incentives, and managerial actions) are significant determinants of the success of the training process.

OSH risks / Work conditions: Usually, the impact of work-related health risks on the health and safety of employees based on the effect of the following; Physical agents (e.g. noise, vibration, radiation, room temperature), Chemical agents (e.g. asbestos, lead, benzene, pesticides), Ergonomic conditions (e.g. inconvenient work postures, repetitive movements, lifting of heavy materials), Working time arrangements (long and irregular workdays, shifts, night work) and Workplace violence (bullying, harassment, discrimination).

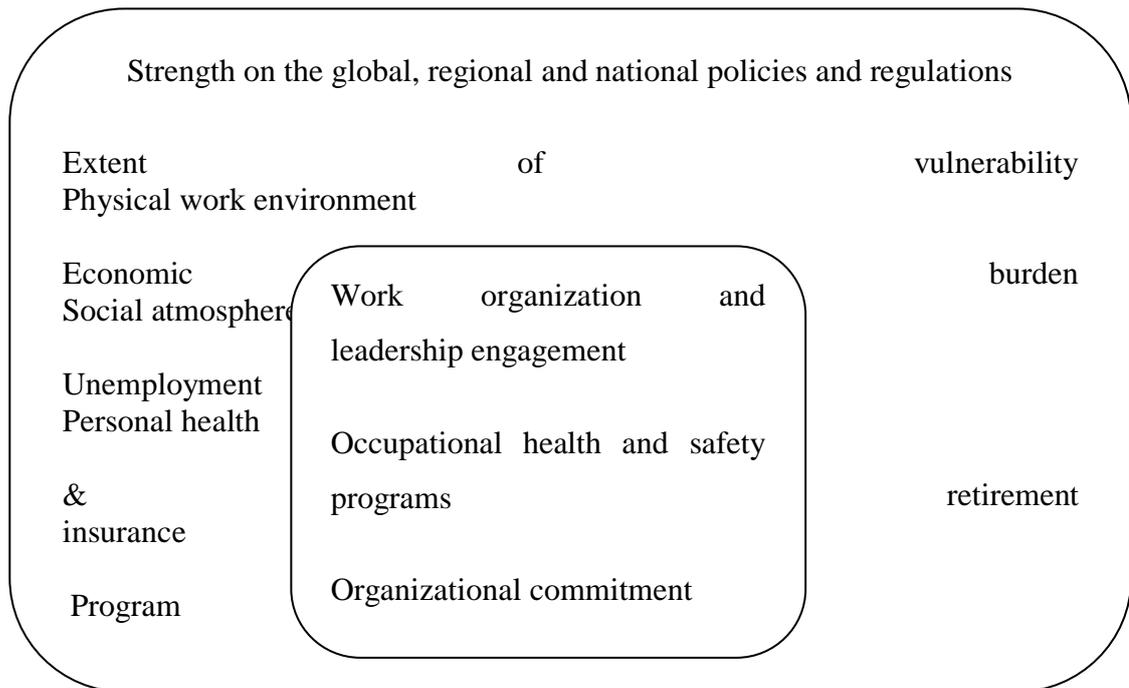


Figure 2.3: Factors influencing workplace hazards

Source: the author, 2018

Clearly, creating a healthy workplace that does no harm to the mental or physical health, safety and well-being of workers are moral imperative (Quinlan, Bohle. &Lamm, 2010). Some other studies have suggested that different risk prevention strategies depends on the existence of conflicting or common understanding of OHS risks between the employer and employees. Despite the reforms and all good intensions in improving the conditions of health and safety in workplaces, regulatory approaches have been criticized for their limited effectiveness in achieving their intended purpose (Jager 2012). In terms of control, employee possesses relevant experience and knowledge of hazards and their cause whereas employers possess the resources capacities to take the necessary control actions (Malcarie, 2006).

The need for up-to-date information on OSH are of critical importance for the purposes of identifying areas of required action and for setting priorities for policy initiatives on improving health and safety at work. According to recent ILO (2008) estimates, the global number of work-related fatal and non-fatal accidents and diseases does not seem to have changed significantly during the past 10 years. This is mainly driven by the globalization process and by rapid industrialization in relatively poor countries that are not capable of maintaining effective OSH systems. It has therefore been argued that the need to focus on health and safety are as paramount as ever, given that “the traditional hazard and risk prevention and control tools are still effective but need to be completed by strategies designed to address the consequences of a continuous adaptation to a rapidly changing world of work”.

2.6. Practice Compliance to international safety standards in health facilities

Occupational Safety and Health (OSH) has become a global concern for employers, workers and national governments. Despite global efforts to address OSH concerns, it was estimated that 2 million work related fatalities still occur every year (ILO, 2009). The Occupational Safety and Health Act (2007) laid strong emphases on safety, health and welfare of workers and all persons lawfully present at workplace. The Act specified that under the Directorate of Occupational Health and Safety Services (DOHSS) the principal objective should be promotion and enforcement of occupational safety and health regulations at workplaces. Notwithstanding, a lot of accidents still occur at workplaces has continued to increase (Mutemi, 2005). Assessment of compliance to safety standards in line with prevention of occupational injuries and illnesses in workplace helps to keep tract with both the health outcomes and the associated workplace environmental condition.

Occupational safety and health surveillance activities should be ongoing and involves systematic collection, analysis, interpretation and dissemination of the effective prevention strategies be employed (U.S. Department of Human Services, 2014). The surveillance audits should be based on special checklists and guidelines that should be made available to all. The scope of the surveillance of the work environment should be identification and evaluation of the environmental factors that

might affect the workers' health, assessment of conditions of occupational hygiene, assessment of personal protective equipment, and assessment of exposure of workers to hazardous agents and control systems designed to eliminate or reduce exposure (Mutemi, 2005)..

Some Gaps in the existing law on OSH in Rwanda

Low institutional capacity for enforcing the OSH Policy implementation

Poor regulations for the most hazardous sectors in OSH

Limited human resources capacity on OSH affairs

Limited resources for OSH Policy and strategy implementation

Inadequate capacity for OSH inspection and enforcement

Lack of updated and disaggregated data on OSH

Lack of clear mechanisms for ensuring compliances and inspections

Low level of preventive culture among institutions

Inadequate mechanism for collecting, analysing and reporting and disseminating OSH data and information

Low level of Accidents reporting, recording and investigating

Poor mechanisms for OSH activities coordination;

2.7. Factors that would help improve the workers practices in developing countries

The health System processes and structures such as rules and roles serve to maintain systems stability whereas roles of persons occupying a particular social position help to maintain system balance. Functionalist sociology assumes that these interactions are there to make thing work in health care setting. Information influences what

happens when people change their behavior in order to be correct. In situations where we are unsure of real motive of the situation, we are left to determine the level of information people have in relation to subject matter and as a guide for their behaviours. Normative influence stems from a desire to avoid punishments (such as going along with the rules or regulations which you don't even understand) and gain rewards or avoids harm of punishment. Normative conformity involves changing one's behaviour in order to fit in institutional regulations. Conformity is something that happens regularly in our social worlds, (Kassin, Fein, & Markus, 2011).

Sometimes we are aware of our behaviour, but in many cases it happens without much thought or awareness on our parts. Some of the best-know experiments on the psychology of conformity deal with people going along with the group, even when they know the group was wrong. According to Perloff (2003), persuasion could be a vital tool in convincing other people to change their attitudes or behaviours regarding an issue through the transmission of a message in an atmosphere of free choice (training on safety standards in health institutions). Persuasion are symbolic, utilizing words, images, sounds, etc., It involves a deliberate attempt to influence others to comply to set rules (Breckler, Olson, & Wiggins, 2006).

In psychology, compliance refers to changing one's behaviour due to the request or direction of another person, the individual acted in some way because others asked him or her to do so, (Breckler, Olson, & Wiggins, 2006). People are more likely to comply when they believe that they share something in common with the person making the request. Each theory to social work practice providing a synthesis of classical and contemporary theory for scholarly analysis and application to professional, intellectual, and social action.

2.8. Knowledge Gap

Though data sources on health and safety at work are readily available, there are still not many studies conducted in this area, many existing studies are either incomplete, obscure and with topics that are not really capturing the main issues (HSE, 2004).. There are need for harmonization and international comparability of well-designed study. Also, there should be ease of comparability in terms of methodology and

quality moreover, a lot could be done to curb the differences in social laws and administrative regulation practices as a way forward. There are equally need to properly identify the multiple factors in the aetiology of occupational hazards and pay closer attention to risks aggravated by job insecurity and poor training of workers in the workplace. May be an interdisciplinary approach might help to throw more light in identification of key issues and /or reforms that could help strengthen worker safety.

Other areas of research gap are; hazards effects on reproductive health, cultural barrier to safety health and low level of skills possessed by workers (ILO, 2008). Policy amendments are equally urgently needed to address workers welfare, training and rehabilitation of disabled and injured workers and design of reintegration opportunities (EASHW, 2002). More research would help to identify the economic and non- economic relationships to occupational hazards. In most cases, research gaps in Africa are tailored to low government interest, poor data and information management system and records, these are often worsened by weak regulations and enforcement system (evidence Ebola crisis).

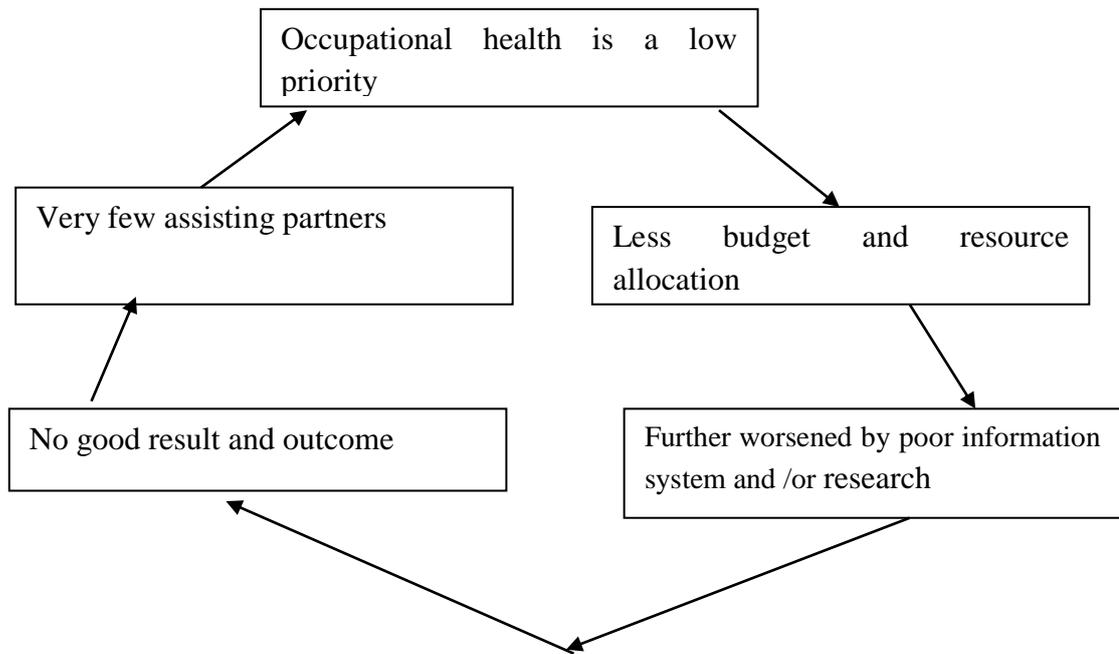


Figure: 2.4: Occupational health “cycle of neglect” in developing countries

Source: the author 2017

Study in occupational hazards if timely would give room for better understanding of issues related to hazards, response processes and the measure of its consequences.

In a study carried out by Muthuviknesh and Kumar (June, 2014) on” the effect of occupational health and safety management on work environment” Study design was prospective qualitative research method, while the objective was to analyze the effect of occupational safety management on work environment and health. Structured interview and questionnaire was the instrument employed in data collection. Non-probability sampling techniques were used to draw the sample for the study and the analysis was based on percentages. The reference system contained references that date back to twenty years. I believe that the study design was appropriate but the

Instrument used would have included focused group discussion. Also basing the analysis on percentages was not appropriate for strong scientific based evidence.

Another study conducted by Amanda. (2011), workforce survey of occupational exposure and effects in New Zealand, with the aim to determine the prevalence and distribution of occupational exposure and workplace practices. Over 10,000 participants were used in the study, through telephone interview method of data collection. Finding show exposure to physical hazards, dust, chemical. The study showed clear relationship between exposure to hazards and health illness effect. But I still believe that if several options for occupational exposure are pursued, for instance several workforce surveys, workforce observation surveys, and workforce measurement and registrations for exposed persons might provides broader and better evidence.

Study conducted by Ndejjo *et al.*,. (2015) on occupational health hazards among health workers in Uganda; they assessed the occupational health hazards faced by healthcare workers and the mitigation measures. The method employed was cross-sectional quantitative study approach and 200 study participants were randomly selected and used in the study. The references contain majority of references that date ten years with few in the twenty. The study used only questionnaire, I believe focused group, reports and may be observation, and if added to the questionnaire would have generated more sound information. However, the statistical instrument (adjusted odd ratio) used for the predictors in the analysis was adequate.

Lastly, the study conducted by Burdorf (2004) on Identification of determinants of exposure: consequences for measurement and control strategies. Had few outdated references, methodology of approach was not clearly defined. But more than one instrument design was used to collect data which was good and analysis was good too.

Conclusively, in my review, I realized a strong gap given by the absence of study in the occupational hazards in Sub Saharan Africa. This study therefore, is timely and will fill the research gap, but more research is still needed to be able to have a full coverage of the topics that still needed to be researched on. For instance, study on the effect of the hazards on job performance, also consequences of the hazards and worsening effect on human resources shortage, assessment of the effectiveness of

safety training as measures countering occupational health hazards in workplace, just to mention a few. An investigation to assess the consequences of hazards exposure and illness outcome may be helpful, also the barriers to effective communication of safety standard and practices are equally useful.

CHAPTER THREE

MATERIAL AND METHODS

3.1. Study Site

The Kigali city is the one of the five provinces in Rwanda and covers a total area of 730 square kilometres. It has an estimated total population of almost a million giving a population density of 1,165.8/km². Kigali city has three major Districts namely Nyarugenge, Gasabo and Kicukiro, These districts have government district hospitals that were selected as a study site. The selected hospitals included; Muhima Hospital in Nyarugenge District, Kibagabaga Hospital in Gasabo District and Masaka Hospital in Kicukiro District. The district hospitals served population that are mostly middle and low income from Kigali city and its immediate environs. The population are on the national social health insurance scheme mutuelle de santé whereby the patient pays ten percent of the total cost of services received.

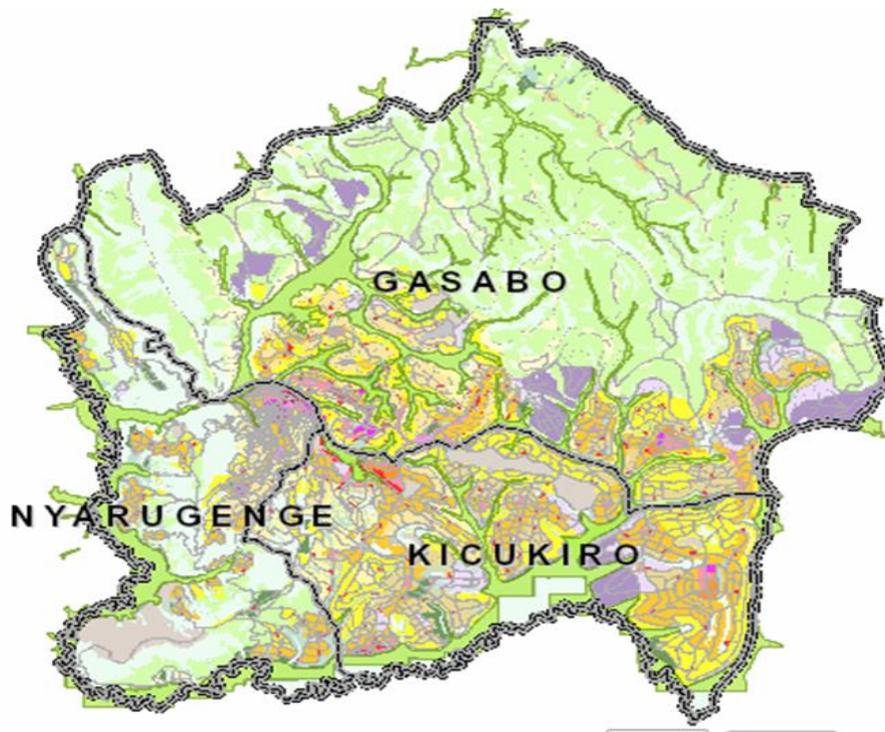


Figure 3.1: The Map of Kigali City showing the three Districts

Kibagabaga District Hospital is located in the Gasabo District and receives an average of 230 patients every day and has 120 beds. It sees 1700 referral cases and refers around 900 cases to teaching hospitals each year. It is staffed by 5 specialists, 11 general physicians, 54 nurses, 27 midwives and 89 employees. Departments: Obstetrics and Gynaecology, Internal medicine, Paediatrics, Ophthalmology. The hospital also supervises 6 health centres and a prison.

Masaka District hospital is located in Kicukiro district, in Masaka sector, it served about 355195 populations and with 148 bed capacity. It receives patient in out patient's clinic of about 110 per day, 3,304 per month and with 787 in patients. It is staffed by one specialist, 12 general physicians, 103 nurses, 29 midwives and other 92 employees. The clinical department offers emergency, OPD, NCDs, Internal medicine, Obstetrics and Gynaecology, Paediatrics, Surgery, Neonatology ambulance. Allied department offers the following services: Dental, Ophthalmology, GBV, Medical imaging, and mental health, Physiotherapy, lastly Laboratory and Nutrition.

Muhima District hospital is located in Nyarugenge district, in Muhima sector, it served about 326478 populations and with 184 bed capacity. This hospital receives an average of 201 patients every day and oversees about eleven health centres, and clinic at the Rwanda central prison in Kigali. Muhima is the training site for all medical schools and schools of nursing and midwifery in Rwanda. It has total of 13 departments including: OPD, and NCDs, just as in Masaka mentioned above apart from Ophthalmology. It is staffed by 5 specialist, 17 general physicians, 45 nurses, 52 midwives and other 59 employees.

Table 3.1: the sum of 631 health care workers from the selected health facilities in the districts in Kigali city

THE SUM OF 631 HEALTH CARE WORKERS FROM THE SELECTED HEALTH FACILITIES IN THE DISTRICTS IN KIGALI CITY																
	Med. Dr.	Dentist	Anaesthetists	Nurses A0 /A1	Midwives A1	Pharmacist A0 / A1	Radiologist A0 / A1	Laboratory worker A0, A1	Hosp. Mgt. Staff	Mortician	Laundry	Cleaners & potters	Staff working in Radiology	Sterilization/laundry	Maintenance Staff	Total
Muhima District hospital	22	5	9	45	52	2	1	6	5	4	3	30	2	21	4	216
Kibagabaga district hospital	16	6	10	50	27	2	3	3	6	2	2	55	4	2	2	188
Masaka district hospital	13	2	7	100	24	3	5	10	3	1	2	49	4	3	4	227
Total	51	13	26	195	103	7	9	19	14	7	7	134	10	26	10	631

3.2. Study Design

This study adopted cross-sectional design utilising quantitative and qualitative approaches.

3.3.1. Target Population

The target population consisted of varying cadres of workers in Kigali District health facilities. These workers are potentially exposed to several hazards in their various work places.

3.3.2 Study Population

Study Population constituted 631 workers in the three health facilities in Kigali city. These comprised: Hospital management / leadership Staff, Medical Doctors, Nurses (A0 / First degree & A1 / diploma level), Midwives, Laboratory Scientist (A0 & A1), Dentist (A0 & A1), Radiologist (A0 & A1), Anaesthetist (A0 & A1) and the Pharmacists (A0 & A1), Medical support staff included in the study: Potters, Cleaners, Morticians, workers in sterilization unit and those in Pharmacy, and Radiology unit. List of these selected health facilities and the numbers of various categories of the health care workers are show on the table on the study site above.

Note: AO stand for First degree qualification while A1 are with higher diploma

3.4. Study Variables

3.4.1. Dependent Variable

In this study, the dependent variables were the different occupational health hazards suffered by health care workers as they carry out their duties. These hazards might arise from factors in the working environment, or from different individual level determinant factors including personal characteristics, problems with compliance to safety standards, may be from safety enforcement, regulations and supervision. Another dependent variable was compliance to national health and safety policy by the health care workers, hospital management / leadership and waste (managers with regards to enforcement, regulations, training, supervisions and evaluation and compliance to occupational safety rules by workers and employers).

3.4.2. Independent Variables

Independent variables in this study included: Personal characteristics, habits (smoking, Alcohol), age, gender, educational level, duration of service, hour of work per day and number of days per week, engaging in other work or job and safety rules operating in the work department and types of job and work environment. Workers level of awareness of the occupational health and safety programs in the work place. Workers opinion about the safety measures in their workplace.

Types of mitigation strategies adopted in the health facilities to manage occupational health hazards in your work place. The individual - level determinant factors influencing occupational health hazards and the health facility – level determinant factors influencing occupational health hazards

3.4.3. Inclusion Criteria for the selection of study participants:

The following are examples of the health care workers that were included in the study:

Health care workers in the designated working stations for more than one year (1 year) that have jobs that make them have direct contact with patients' with communicable diseases or might be exposed or handle contaminated specimen (e.g., blood, urine, stool and other bodily fluids, hospital wastes and other formites).

Also those who handle chemicals, radio- active materials and hospital equipments during their routine clinical duties and the hospital management and leadership staff.

Health care workers who were willing to participate in the study

Health care workers who gave written informed consent to participate

3.4.4. Exclusion criteria for the selection of study participants:

Health care workers who were newly employed health care workers for period less than one year (< 1year) and those working outside the scope of the study

Health care workers who were not willing to participate in the study

Health care workers who failed to give written informed consent to participate

3.5. Sample size

The sample will be calculated using Slovene's formula for calculation of sample size with the formula. This gives us 249 as the sample size as shown below:

$$n = \frac{N}{1 + N(\epsilon)^2} = n$$

n = sample size

N = Population

e = marginal of error, e = 0.05

$$n = 631 / (1 + 631 * 0.05^2) \quad n = 249$$

To work out sample size for each stratum in the health facilities, stratification sampling by weight was used to calculate specific sample sizes. Sample size for medical Doctors in Muhima District Hospital;

Note: $n_h = nN_h / N$

$$n_1 = 249 (22) / 631 = 9$$

Table 3:2. The distribution of study participants within the various selected health facilities

study sample (249)
Health care workers in the various selected health facilities in the districts in kigali city

	Med. Dr.	Dentist	Anaesthetists	Nurses	Midwives	Pharmacist	Radiologist	Laboratory worker	Hospital Management Staff	Mortician	Laundry	Cleaners & porters	Waste mgmt. staff	Sterilization	Maintenance Staff	Total
Muhima	9	2	3	18	20	1	1	2	2	1	1	12	1	8	2	85
Kibagabaga	6	2	4	20	11	1	1	1	2	1	1	22	1	1	1	74
Masaka	5	1	3	39	9	3	2	4	1	1	1	19	2	1	1	90
Total	20	5	10	77	40	5	4	7	5	3	3	53	4	10	4	249

3.5.1. Sampling Technique

The three selected district health facilities in Kigali city were chosen purposively because they are the only existing district health facilities and have categories of

health workers who are able to supply information vital for the study based on their experience and ease of accessibility. Stratified sampling technique was used to select the various categories of health care workers due to their heterogeneity. Systematic random technique was used to determine the participants based on the list of the health workers in the nominal role records and based on the availability of the health care workers in the three selected health facilities in the Districts in Kigali city. Systematic sampling technique was used to determine the intervals on the workers names represented by numbers from each professional group and then simple random sampling technique by balloting without replacement was later used draw the study participants from each stratum. However, in some categories of the participants with very small numbers, the total population was selected. The resulting sample makes up the final sample that was used for the study.

3.6. Instruments for data collection

In this study both primary and secondary data were collected. Primary data were collected using semi-structured questionnaires, key informant interview guides, focused group discussion guide and observational checklist. Secondary data were collected from policy documents reviews. The study instrument were designed based on information from existing literature which was deemed necessary to help supply information on the research question and within the scope of the study.

3.6.1. Primary source of data: Questionnaire

The primary study instrument adopted was a self- administered semi-structured questionnaire for separate groups of study participants. The questionnaire was divided into three parts. One part covered demographic profile of respondent seeking participant characteristics; the second part was designed to seek information related to the safety awareness, persons and health facility level influencing factors and the third part covering assessing types of health hazards and safety compliances: Further information was sought through focus group discussion, key informants interviewed and observation to help improve the quality of the generated information for better understanding of the problem.

3.6.3 Focused group discussion

The research was conducted on purposively selected participants of different cadres of the health care workers; from three selected health facilities in Kigali. This was in order to get their perceptions and opinions about the determinants of occupational health hazards and compliance to safety in workplace. A total of eleven health care workers were engaged in the discussion.

3.6.4. Key informant interviews were carried out on occupational health and safety officers, chairperson of the health facility and the person in charge of hygiene and hospital waste management. Data collected qualitatively helped in providing complementary information to the quantitative data.

Health facility Inspection / Observation:

Observation checklists were used to collect data on workplace environment in relation to safety mitigation strategies put in place. The observations of interest included; presence or absence of fire extinguishers, waste storage and collection systems adopted, level of noise and air pollution, ventilation provisions, hygiene standard and equipment maintenance.

3.6.5. Secondary source of data

This study used policy document on occupational health and safety regulations for health facility. Empirical studies continue to inform this study that, secondary sources of literature provide a contextual understanding of the subject being studied and can lead to a preliminary, non-binding foundation of the researcher's hypotheses (Ickowitz , 2012).

3.7. Validity and Reliability of the Instruments

The validity of instruments was measured using Content Validity Index. Two assessors /experts in the field of study were used to rate the content in the questionnaire. These experts also assisted in assessing the phrasing of the questions to avoid ambiguity. The researcher viewed each statement with the help of experts

and assessed the extent to which the questions were related to the topic of the study. The researcher compiled the responses from the two experts and computed the Content Validity Index (CVI). The estimation for validity was 0.75 and above, meaning that any value below it would make the instruments invalid (Mohesen and Reg (2011)).

Table below shows a summary of the experts' ratings.

$$CVI = \frac{\text{Number of Instrument declared valid}}{\text{Total number of items}}$$

Table 3.3: Determination of Reliability and Validity of the Instruments

Variables	Relevant items	Irrelevant items	Total
Profiles of the respondents and SMEs identification;	9	2	11
Level of awareness on concept of workplace occupational health and safety	6	1	7
Workers opinion of safety measures in their workplace	9	1	10
Individual Level factors influencing workplace occupational hazards	9	3	12
The health facility related factors associated with workplace occupational hazards	9	1	10
Waste management assessment guide	8	0	8
The focus group discussion / guide of interview;	7	1	8
Total	57	9	66

$$CVI = 57/66 = 0.86$$

The CVI of 0.86 was greater than 0.75, hence the instruments was considered valid.

Pilot Test

To ensure reliability of the instruments, data collection instruments were pre-tested. Pilot test of the survey questionnaire was done using the sum of 16 different cadres of health care workers purposively selected from a similar population at Sante Da La Criux Hospital (a private hospital in Kigali) to help test and ensure the validity of the instrument. After piloting, necessary changes were made to the questionnaire to make sure it well adapted to the study participants and final approval of the instrument. The study instrument was further translated to the local language (Kinyarwanda) to ease data collection.

The reliability statistics

Cronbach's Alpha: Number of items was 66 and test result was .723 (Mohesen and Reg (2011)

The pre-test results indicated that the questionnaire was reliable because the reliability statistics was greater than 0.5. In case RS is less than 0.5, the instrument would be unreliable on standard.

3.8. Data collection

The actual data collection lasted for two months with the help of two research assistants after training and update of the data collection method. The data collection process was carried out on daily basis and in each of the selected health facility. The researcher went with all the necessary administrative and authorization documents (letter of introduction). At the end of each data collection day, the researcher and the research assistants met at designated venue to share the day's experience and also to receive the completed questionnaires. The researcher went through the completed questionnaires noting any the problems that ranges from incomplete and poorly filled data. Such anomalies were followed up in subsequent visits and rectified and completed by the participants. In some instances where the data collection tool was not returned, the research assistant and the researcher have to personally visit the departmental head to look for the tool and request for the completion of the data. At the end of the data collection, completed and checked questionnaires were sorted, arranged and secured by the researcher and ready for analysis. The data collected

were kept safely by the researcher to ensure that there is no damage or loss before data entry. Records of the data size and details was maintained and used to cross check the data during data entry and development of plan for data analysis. Generally data checks were carried out at regular basis to ensure accurate and valid report.

3.9. Data Analysis

The data generated from the study was coded and entered into the computer programs EPI data and exported to SPSS (version 21), the data were cleaned for consistency and quality control. The analysis was guided with the data plan designed in line with the study objectives. Data analysis for the variable of respondent background characteristics, the researcher used descriptive statistics to determine the profile of the respondents in frequency and percentage distribution and 95% confidence interval presented in frequencies tables, graphs and charts. The variables were weighted using average score rating and the variables were further put into categories of three. Test for the degree of association between independent and dependent variables were done using Pearson chi-squared tests to assess whether there was a significant difference for each independent variable at the level 0.05 significance.

Also regression analysis was equally used for testing association between variables. It assesses the extent to which it becomes easier to know the predictive value for the dependent variable from a known case's value of the independent variable. A measure of association throws light on the relationship between variables under study. This measure of association relates to how much better this prediction variable is and is and often ranges between -1 and 1. Where the sign represents the direction of correlation (negative or positive relationship) and the distance away from 0 represents the degree or extent of correlation. The further the number away from 0, the higher or more perfect the relationship in between variables. Measure or observe pairs of variables would help to determine how the 2 variables behave together. Lastly, results of qualitative data were used to support the quantitative findings and regression analyses were used for conclusion and recommendation.

The Dependent variable includes; the workplace hazards experienced, Occupational hazard health outcomes, compliance to safety standards and practices and waste management practices. The independent variable comprised the Participants profile, awareness / opinion on occupational hazards and safety, prevention strategies, individual and health facility factors influencing workplace hazards and waste management system.

To determine the relationships and causal effects between variables, factor analysis and regression analysis were used.

Description	Interpretation
Strongly Agree	Very High level
Agree	High
Neutral	Moderate
Disagree	low
Strongly Disagree	Very Low

3.10. Ethical Consideration

In all health research; ethical consideration are very crucial and an important aspect that focuses on the study participants. Strong considerations are given to the extent to which the study participants are giving freedom to choose whether to participate or not. The researcher observed ethical standards in professional practices during the research study by doing the following: Ensuring accuracy in data collection and processing, using systematic procedures to ensure that data collected and information processed were accurate.

The researcher in this study strictly ensures that the information's obtained from the respondents were handled with utmost confidentiality. And that the results of the study were reported in a generalized manner and for the purpose of this study only. The participants were given full information about the procedures, expectations and

the role they would play as well as the purpose of the study. They were given time to carefully deliberate on whether to participate or not.

All the study participants remained anonymous; hence their individual identities were not disclosed. The questionnaires were designed in a way that the initials of respondents were only used. The reporting was done in a generalized manner. However, consent to participate in the research was obtained from each study participants, also authorization to conduct the study was obtained from Jomo Kenyatta University of Agriculture and Technology, Kigali Campus, from the Rwandan National ethical board and from the minister of health in Rwanda. The researcher ensured that all respondents own their own consent to participate in the study by signing the consent form.

The researcher ensured that participants are respected and respect given to all their decisions including decision not to participant and the less powerful groups of participants were protected. The researcher ensured that no harm was allowed to the respondents in the course of the study. Utmost consideration were given to the welfare of the respondents including; mental, physical health safety. The researcher took all the necessary steps to avoid injury of the respondents and persons who was involved in the research. The researcher avoided questions or issues that would cause embarrassment, guilty, discomfort, or risks, where such questions were inevitable. They were asked in a less sensitive manner with due respect and the respondents were informed accordingly at the outset of the study.

Study participants were allowed to decline to answer any particular questions or sets of questions they don't want to answer and to withdraw from the study at any time, or decline to have their responses recorded and access to the findings summary.

3.11. Response rate

At the end of the data collection it was observed that out of the sum 249 (100%) study respondents, 237 survey questionnaires were filled and returned from the study participants from the three selected health facilities as shown below in table. This represented 95.18% response rate which the study considered sufficient for analysis.

The researcher's hand delivered and collected questionnaires increased the response rate.

Table 3.4: Response rate

Distribution of survey respondents (n=249)	<i>Frequency</i>	<i>Percentages (%)</i>
Muhima health facility	82	32.9
Kibagabaga health facility	69	27.7
Masaka health facility	86	34.5
<i>Total</i>	237	95.1

CHAPTER FOUR

RESULTS

4.1 Demographic Characteristics of the Study Participants

Profiles of the respondent in this study were described according to age, education level and professional categories. Data was collected from total of 237 participants, consequently; out of the 237 participants, 100 (42.2%, 95% CI. =35.83 – 48.76) males and 137 (57.8%, 95% CI. =51.24 – 64.17) were female. In addition, 103(43.5%, 95% CI=37.06 – 50.03) of participants had 3 to 6 years working experience in the health facility. Majority of the study participants 109 (43.8%. 95% CI= 37.51 – 50.18) had worked for 3 to 6 years. The predominant age category of the study participants were those in the age cohort of 30 - 39 accounting for 129(57.8%) of the total participants. Person's age 18 - 29 years were 73 (30.8%). With regards to risks behaviour such as smoking and alcohol use, about 235 (99.2%) were smokers while 214(90.3%), consumes alcohol.(table 4.1).

Table 4.1: Background Characteristics of the study participants (n = 237)

Item Variables	Proportion of Yes	Proportion of Yes	95% Confidence Intervals
Health Facility used in the study			
Masaka in Kicukiro District	86	36.3	(30.16 – 42.76)
Muhima in Nyarugenge District	82	34.6	(28.56 – 41.03)
Kibagabaga in Gasabo District	69	29.1	(23.41 – 35.35)
Respondent Gender			
Male	100	42.2	(35.83 – 48.76)
Female	137	57.8	(51.24 – 64.17)
Respondent Age group			
Age group 18 - 29 years	73	30.8	(24.99 – 37.10)
Age group 30 - 39 years	129	54.4	(47.86 – 60.89)
Age group 40 - 49 years	30	12.7	(08.71 – 17.57)
Age group 50 years and above	5	02.1	(00.69 – 04.85)
Whether respondent takes alcohol			
No	214	90.3	(85.79 – 93.75)
Yes	23	9.7	(06.25 – 14.20)
Whether respondent smokes Cigarette			
No	235	99.2	(96.99 – 99.90)
Yes	2	0.008	(00.10 – 03.01)
Respondent duration of work experience			
Had for less than 3 years	62	26.2	(20.68 – 32.24)
Had worked for between 3 and 6years	103	43.5	(37.06 – 50.03)
Had worked for 7 to 9 years	45	19	(14.19 – 24.57)
Had worked for 10 years and above	27	11.4	(07.64 – 16.14)

Furthermore, description of the study respondent educational background showed that about, 103 (43.5%, 95% CI=37.06 – 50.03) of participants possessed diploma certificate, 57 (24.1%, 95% CI. =18.75 – 30.01) had secondary level education while 3 (01.3%, 95% CI. = 00.26 – 03.65), had no formal education.(figure.4.1)

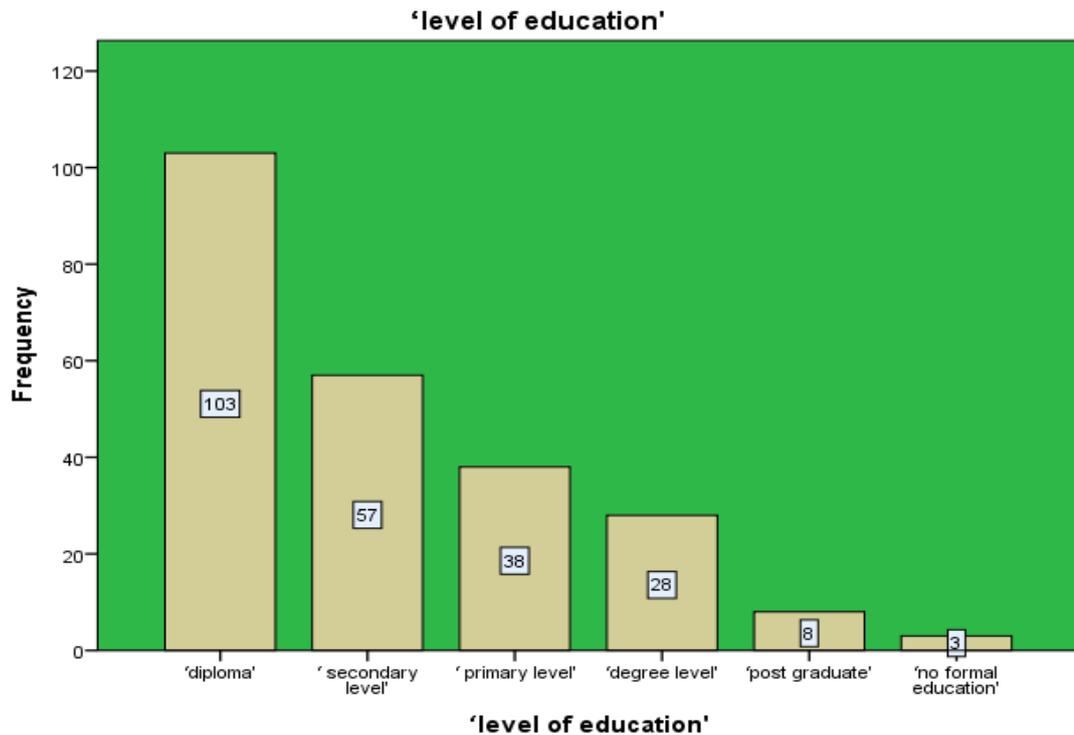


Figure 4.1: The study participants educational background characteristics

A total of 168 (70.9%, 95% C.I.=64.65 - 76.59) study participants carries out their duties in the night, while 69 (29.1% 95% C.I.= 2.41 – 5.5) do not. Also about 156 (65.8%, 95% C.I. = 59.40 - 71.84) of respondents were not aware of the existence of occupational health and safety program while 155(65.4% 95% C.I. =58.97 – 71.44) respondents does not know the person in-charge of occupational health and safety in their health facility. Majority of the respondents 149(62.9% 95% C.I. =56.38 – 69.04) works for average of 5 days in a week. (table 4.2).

Table 4.2: Other background characteristics information of the study respondents

Item Variables	Proportion of Yes	%	95% Confidence Intervals
Whether you do Night shift			
Yes	168	70.9	(64.65 - 76.59)
No	69	29.1	(23.41 – 35.35)
The existence of safety program in the health facility			
No	156	65.8	(59.40 - 71.84)
Yes	81	34.2	(28.16 - 40.59)
Whether there is a person in-charge of safety in the health facility			
No	155	65.4	(58.97 – 71.44)
Yes	84	34.6	(29.36 – 41.89)
Average number of days worked per week			
5 Days	149	62.9	(56.38 – 69.04)
6 Days	76	32.1	(26.17 – M38.41)
7 Days	12	5.1	(02.64 – 08.68)

The study participants Professional categories

Out of 237 study participants 72 (30.4%) were Nurses; 52 (21.9%) were Potters and Cleaners, while 35 (14.8%) were Midwives. Meanwhile, the least proportion of professional categories that participated in the study were the Laundry staff accounting for 3 (1.3%) as well as Morticians 3 (1.3%). (Figure 4.2).

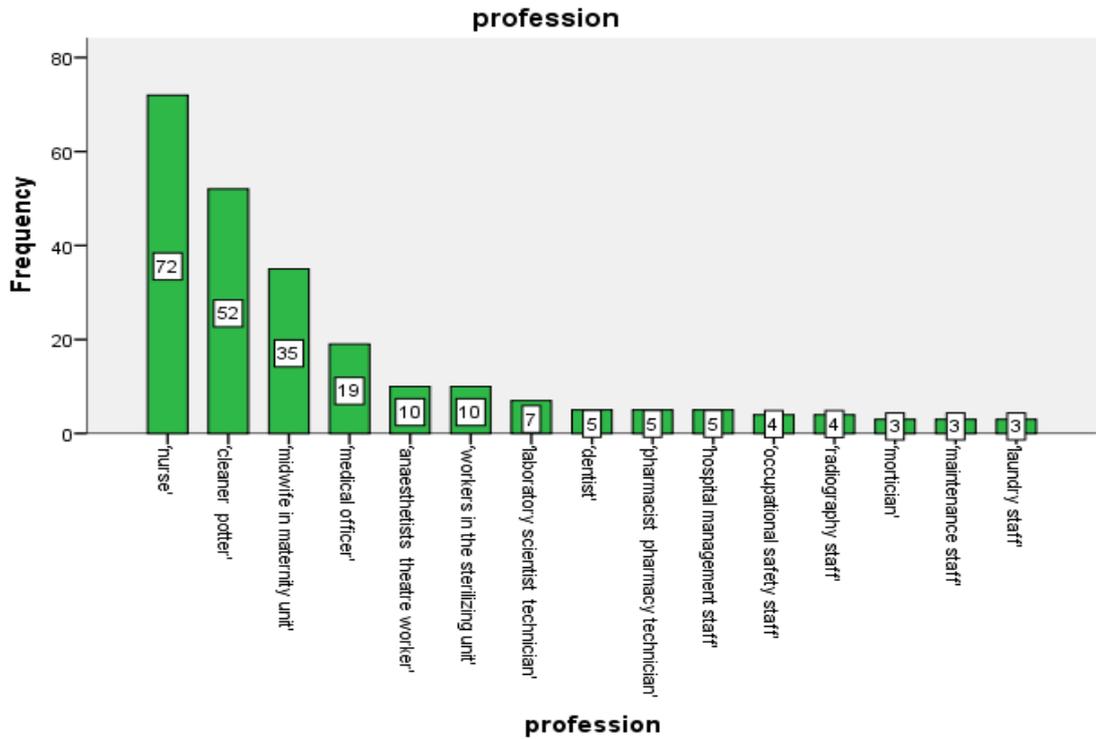


Figure.4.2: The study participants Professional categories (n = 237)

Background information of study participants with regard to number of hours of service worked per day and history of having another job outside the present commitment.

Majority of the study respondent work for average 9 hours per day 171 (72.2%, 95% C.I= 65.98 – 77.76). The number of the study participants that does not have another jobs outside their work in the health facility were 230 (97%, 95% C. I=94.01 – 98.80). (Figure 4.3).

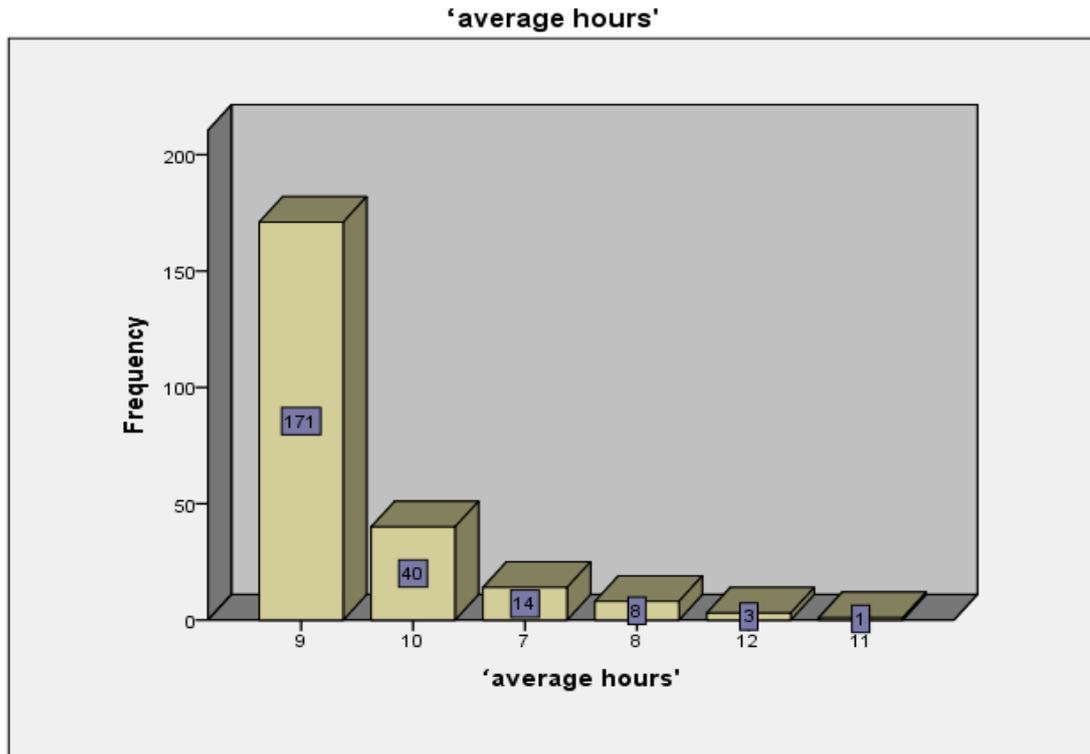


Figure 4.3: The study participants’ response with regard to number of hours worked per week

Information from study participant on knowledge of the concept of occupational health safety program in workplace, about 135 (57%) of the respondent agree that work safety action is an important component. In like manner, 157 (66.2%) of the respondents are aware that health facility safety is an important component too. In all other component variables of health safety program in workplace the respondent agreed and are aware of the occupational health and safety program in work place. (Table 4.3).

Table 4.3: The responses on the level of awareness of what occupational health and safety program in the work place (n = 237)

Question items on the Component concept of what occupational health safety program in workplace meant	Disagree		Neutral		Agree	
	Freq.	%	Freq.	%	Freq.	%
Work safety actions / responsibility	35	(14.8)	67	(28.3)	135	(57.)
Health facility safety	23	(9.7)	57	(24.1)	157	(66.2)
Employee orientation/ training	33	(13.9)	42	(17.7)	162	(68.4)
Work space inspection/ supervision	12	(5.1)	52	(21.9)	173	(73.)
First Aid	12	(5.1)	60	(25.3)	162	(68.4)
Health and Safety Promotion	25	(10.5)	50	(21.1)	162	(68.4)
Reporting and investigation accidents/incidents	29	(12.2)	51	(21.5)	157	(66.2)

Attempt to categorise the respondents level of knowledge and awareness of occupational health and safety in workplace showed that about 99 (41.85%) have high knowledge and awareness. (figure 4.4).

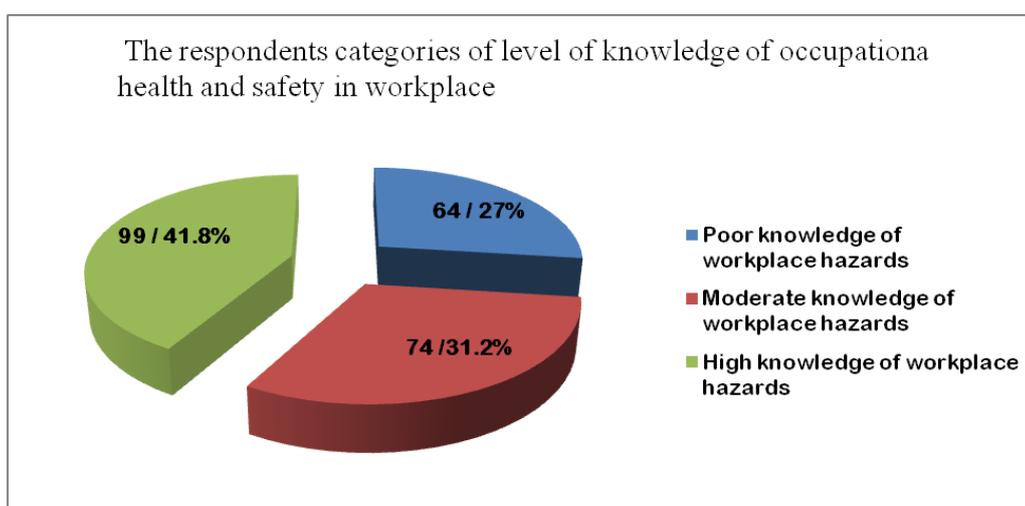


Figure 4.4: The respondent level of knowledge of occupational health and safety in workplace

The study findings from study participants about their opinion of workplace hazards and safety measures showed that about 73 (30.8%) agrees that workplace contains harmful chemicals, gases and contaminated products. About 83 (35%) responses agree that tasks are performed either in prolonged standing or sitting position. Another 80 (33.8%) responses agrees that safety awareness can be enhanced by training and communication, while about 71 (30%) responses strongly disagrees that washing hands after work can prevent diarrheal diseases as a safety measures. Also about 63 (26.6%) agrees that wearing apron can reduce physical damage to your body as a safety measure. (Table 4.4).

Table 4.4: The study participants about their opinion of workplace hazards and safety measures

Question on respondents' opinion of workplace hazards and safety measures	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	Prop.	%	Pro p.	%	Pro p.	%	Pro p.	%	Pro p.	%
Workplace contains harmful chemical, gases and contaminated blood products	55	23.2	47	19.8	24	10.1	73	30.8	38	16
Task are performed either in prolonged standing or sitting position	31	13.1	37	15.6	48	20.3	83	35	38	16
Workplace exposure to condition like tuberculosis, HIV & AIDS infection, asthma, hepatitis,	64	27	45	19	42	17.7	68	28.7	18	7.6
Safety awareness can be enhanced by training and communication	43	18.1	45	19	52	21.9	80	33.8	17	7.2
Wearing glove / boots can reduce damage to hands and foot	68	28.7	50	21.1	32	13.5	64	27	23	9.7
Wearing apron can reduce physical damage to your body	63	26.6	41	17.3	39	16.5	76	32.1	18	7.6
Wearing mask can reduce damage to respiratory organs	58	24.5	48	20.3	42	17.7	68	28.7	21	8.9
Washing hands after work can prevent diarrheal diseases	71	30	47	19.8	47	19.8	49	20.7	23	9.7
Record of accident frequency and severity rates	46	19.4	57	24.1	59	24.9	56	23.6	19	8

The respondent responses on health facility safety prevention strategies

The results showed about 205 (86.5%, 95% C.I.=81.48 - 90.58) and 186 (78.5%, 96% C.I. =72.69 - 83.54) of the respondents confirms the existence of Health insurance system for workers and safety rules and policy in the health facility respectively. Furthermore, 174 (73.4%, 96% C.I. =67.31 - 78.93) and 172 (72.6%, 95% C.I =66.42 - 78.15) response of the respondents showed that hazards and accidents are investigated and reporting and Equipment procurement and maintenance system are prevention measures adopted in the health facility. Other important observation from the responses that was negative were in respect to Research capacity building on workplace safety related issues from about 137 (57.8%, 95% C.I = 51.25 - 64.17) respondents, another similar question with higher value of negative remark about hazard prevention strategies in the health facility was In respect to health and safety monitoring and audit which has about 114 (48.1%, 95% C.I =41.59 - 54.66) and regular workers Health and safety training which was 109 (46%, 95% C.I = 39.52 - 52.56).(table 4.5).

Table 4.5: Distribution of respondent’s responses with regards to health facility safety prevention strategies

Health facility safety prevention strategies in place	Yes	%	95% Confidence Intervals	No	%	95% Confidence Intervals
Health insurance system for workers	205	86.5	(81.48 - 90.58)	32	13.5	(09.42 - 18.52)
Safety rules and policy in the health facility	186	78.5	(72.69 - 83.54)	51	21.5	(16.46 - 27.30)
Hazard / accident investigation and reporting	174	73.4	(67.31 - 78.93)	63	26.6	(21.07 - 32.69)
Equipment procurement and maintenance system	172	72.6	(66.42 - 78.15)	65	27.4	(21.85 - 33.58)
First Aid medical services	170	71.7	(65.53 - 77.37)	67	28.3	(22.63 - 34.46)
Health hazards communication and surveillance system	147	62	(55.52 - 68.23)	90	38	(31.77 - 44.48)
Dealing with hazardous hospital wastes	142	59.9	(53.37 - 66.21)	95	40.1	(33.79 - 46.63)
Incorporating safety-engineered protection mechanisms in several units	138	58.2	(51.67 - 64.58)	99	41.8	(35.42 - 48.33)
Workers pre- and post- job placement screening, treatment and control	129	54.4	(47.85 - 60.89)	108	45.6	(39.11 - 52.14)
Regular workers Health and safety training	128	54	(47.43 - 60.48)	109	46	(39.52 - 52.56)
Health and safety monitoring and audit	123	51.9	(45.34 - 58.41)	114	48.1	(41.59 - 54.66)
Research capacity building on workplace safety related issues	100	42.2	(35.83 - 48.76)	137	57.8	(51.25 - 64.17)

The respondent’s responses on health facility safety activities (n-237)

The study findings with regards to health facility safety activities showed that about 199 (84%, 95% C. I.=78.66 - 88.40) of the respondents’ responses accepts the practice of regular equipment maintenance and Workplace inspection / supervision about 177 (78.7%, 95%, C. I. = 68.65 – 80.01). Also, about 168 (70.9%, 95% C. I. = 64.65 - 76.59) confirmed the practices of Job training and placement and promotion of safety awareness and safety program 156 (65.8% 95% C. I. = 65.40 – 71.84). Furthermore, a good number of study participants, about 117 (49.4%, 95% C. I.=42.83 – 55.92) respondents’ gave negative remark showing that the health facility does not enforce health and safety regulations in workplace. (table 4.6).

Table 4.6: Study findings with regards to health facility safety activities

Health facility safety activities	Yes	%	95% Confidence Intervals	No	%	95% Confidence Intervals
Regular equipment maintenance	199	84	(78.66 - 88.40)	38	16	(11.60 - 21.34)
Workplace inspection / supervision	177	74.7	(68.65 - 80.01)	60	25.3	(19.91 - 31.35)
Job training and placement	168	70.9	(64.65 - 76.59)	69	29.1	(23.41 - 35.35)
Promotion of safety awareness and safety program	156	65.8	(59.40 - 71.84)	81	34.2	(28.16 - 40.59)
Provision of work safety guidelines and safety information	153	64.6	(38.10 - 70.64)	84	35.4	(29.36 - 41.89)
Providing medical and first aid facilities	146	61.6	(55.09 - 67.83)	91	38.4	(32.17 - 44.91)
Investigating Reporting and investigating all accidents/incidents	140	59.1	(52.52 - 65.39)	97	40.9	(34.61 - 47.48)
Enforcing health and safety regulations	120	50.6	(44.08 - 57.17)	117	49.4	(42.83 - 55.92)

The Hazard control measure adopted in the health facility

About 138 (58.2%) study participants’ agree that health facility have program for eliminating risk of hazards among workers through risk containment, engineering and safety training, also 106 (44.7%) respondents agree that the health facility has time deadlines set for the correction of potential hazards in workplace. Another, important findings are with regards to response outcome that showed that about 123 (51.9%) hospital workers are well informed of the controls measures for hazards in work place, Employer makes every effort to keep away unnecessary stress in the workplace 108 (45.6%) and there are supervisors' assigned responsibilities to ensure hazard controls in the workplace 106 (44.7%). Though about 90 (38%) of the respondents’ are undecided and are not sure as to whether their health facility are able to track and follow up implementation of controls measures to completion. (table 4.7).

Table 4.7: The study participants' response outcomes with regards to hazards control measure in the health facilities

Question on hazard control measures in health facility	S.D		D		U		A		S.A	
	Prop.	%	Prop.	%	Prop.	%	Prop.	%	Prop.	%
Eliminating risk of hazards among workers through risk containment, engineering and safety training	17	7.2	14	5.9	34	14.3	138	58.2	34	14.3
Ability to correct a potential hazard	13	5.5	34	14.3	52	21.9	106	44.7	32	13.5
Time deadlines set for the correction of potential hazards	12	5.1	21	8.9	62	26.2	109	46	33	13.9
Hospital workers are provided with safety information	23	9.7	19	8	75	31.6	96	40.5	24	10.1
All the occupational safety health standards in hospital are in place	26	11	28	11.8	92	38.8	70	29.5	21	8.9
Employer makes every effort to keep away unnecessary stress in the workplace	12	5.1	21	8.9	72	30.4	108	45.6	24	10.1
Hospital workers are well informed of the controls measures for hazards	8	3.4	20	8.4	57	24.1	123	51.9	29	12.2
There are supervisors' assigned responsibilities to ensure hazard controls	18	7.6	18	7.6	73	30.8	106	44.7	22	9.3
Implementation of controls is tracked to completion	15	6.3	24	10.1	90	38	89	37.6	19	8

Key; S.D- Strongly Disagree, D- Disagree, U-Undecided, A- agree, S.A- Strongly Agree

The respondent’s responses on types of hazards report system used in the health facility

The study findings on the types of hazards cases report system showed that incident or near misses cases is the top of 205 (86.5% 95% C.I= 81.48 – 90.58) cases of injuries of illnesses about 200 (84.4%, 95% C.I= 79.13 – 88.76) respectively. However, the least of cases reported based on respondent’ response was cases of mental health problem accounting for 167 (70.5%, 95%.C.I= 64.21 - 76.19). (table 4.8).

Table4.8: Findings on the hazards cases report system that is practiced in the health facility

Question on hazards cases report system in health facility	YES			NO		
	Prop.	%	95% Confidence Interval	Prop.	%	95% Confidence Interval
Injuries or illnesses	200	84.4	(79.13 - 88.76)	37	15.6	(11.24 - 20.87)
Incidents or near misses	205	86.5	(81.48 - 90.58)	32	13.5	(09.42 - 18.52)
Property loss or damage	198	83.5	(78.19 - 88.03)	39	16.5	(11.97 - 21.80)
Environmental damage	179	75.5	(69.54 - 80.86)	58	24.5	(19.14 - 30.46)
Disability and loss	180	75.5	(69.99 - 81.25)	57	24.1	(18.75 - 30.01)
Mental health problem	167	70.5	(64.21 - 76.19)	70	29.5	(23.81 - 35.79)

4.2 The proportion of occupational health hazards cases among the health care workers in health facilities in Kigali Rwanda.

The most prevalent occupational hazards that were identified by the study participants based on diagnosis and treatment in the last two previous year, was working accidents and slips and falls accounting for about 133 (56.1%, 95% C. I.= 49.55 – 62.54) and 82 (34.6%, 95% C. I.=28.56 – 41.03). In like manner, blood borne pathogen cases was about 78 (32.9%, 95% C. I.= 26.97 – 39.29). However, it was observed that occupational hazard cases with the least frequency was Violence and molestation 8 (3.4%, 95% C. I= 01.47 –06.54). (table 4.9).

Table4.9: Proportion of occupational hazards cases among health worker in the health facility (2015 – 2016)

Question on Proportion of Occupational hazards cases in health facility	Yes Prop .	%	95% Confidence Interval	No Prop .	%	95% Confidence Interval
Working accidents	133	56.1	(49.55 – 62.54)	104	43.8	(37.46 – 50.45)
Slips and Falls	82	34.6	(28.56 - 41.03)	155	65.4	(58.97 - 71.44)
Injury with Blood borne pathogen	78	32.9	(26.97 - 39.29)	159	67.1	(60.71 - 73.03)
Hazardous waste	50	21.7	(16.08 - 26.85)	187	78.9	(73.15 - 83.92)
Confined space	41	17.3	(12.71 - 22.73)	196	82.7	(77.27 - 87.29)
Chemical splash	20	8.4	(05.23 - 12.73)	217	91.6	(87.28 - 94.77)
Violence and molestation	8	3.4	(01.47 - 06.54)	229	96.6	(93.46 - 98.53)

Tracing the relationship between the proportion of hazards case that occur in the three health facility with chi-square at 0.05 significant differences (P-value). There was a positive association with regards to regards to Slips and falls, with (p – value =0.001 < 0.05) and with Confined space with findings that showed (p – value = .01 < 0.05). (table 4.10).

Table4.10: The relationship between the Proportion of Occupational hazards cases as it occurred in the three health facility

Proportion of Occupational hazards cases as it occurred in the three health facility	KIBAGABAGA				MASAKA				MUHIMA				Chi-square	D F	P, Value
	Y e s	%	N o	%	Y e s	%	N o	%	Y e s	%	N o	%			
Slips and falls,	24	29.3	46	.7	8	22	8	.9	0	.8	1	.5	14.9	2	0.00
	4		26	.5	37	3	34	4	30	4	38	1.56			
Working accidents	2	31.6	28	.9	0	.6	6	.6	1	.8	0	.5	6a	2	7
Injury with Blood borne pathogen	2	28.2	48	.2	1	.7	5	.6	5	.1	6	.2	.606	2	8
Hazardous wastes contamination	1		29	1	26	7	39	2	46	5	31	4.49	2	0.10	
	4	28	56	.9	3	.0	3	.0	3	.0	8	.0			0a
		22.	31	1	24	7	38	2	53	5	30	8.40			0.01
Confined space	9	0	61	.1	0	.4	6	.8	2	.7	9	.1	4a	2	5
Violence and molestation	3	37.	29		50	8	35		12	8	34	1.74			0.41
	3	5	67	.3	4	.0	2	.8	1	.5	0	.9	5a	2	8

Furthermore, other variables that appear in the study to have statistical association with the proportion of hazards cases in the health facility with chi-square test at 0.05 (P-value) significant levels were Hospital hazards elimination and control measures with (p – value = 0.002 < 0.05) and Workers opinion of workplace safety measures with (p – value = 0.000 < 0.05) respectively.

Another variable statistically significant was Categories of Health care professionals with (p – value = 0.001 < 0.05) and Health Facility Safety Responsibility with (p – value = 0.026 < 0.05). (table 4.11).

Table4.11: The Chi-square test on relationship between categories of the proportion of hazard cases and other influencing variables in the study.

Influencing item variables	Categories of Proportion of occupational hazard cases								Chi - square	d.f	P- value	Interpretation
	Low Proportion		Moderate Prop.		High Prop.							
	Yes Prop.	%	Yes Prop.	%	Yes Prop.	%						
The proportion of hazards cases among health workers and hazards mitigation strategies												
Hazard mitigation strategies	Poor hazards mitigation strategies	23	34.8	25	28.7	16	19	5.256a	4	0.262	Not significant	
	Moderate hazards mitigation strategies	28	42.4	38	43.7	45	53.6					
	High hazards mitigation strategies	15	22.7	24	27.6	23	27.4					
The proportion of hazards cases among health workers and health facility safety activities												
Health facility safety activities	Poor health facility safety activities	29	36.3	17	21.5	18	23.1	5.889a	4	0.208	Not significant	
	Moderate health facility safety activities	35	43.8	39	49.4	37	47.4					
	High level health facility safety activities	16	20	23	29.1	23	29.5					
The proportion of hazards cases among health workers and hospital hazards elimination and control measures												
Hospital hazards elimination and control measures	Poor hospital hazards control	21	37.5	16	18.4	27	28.7	16.558a	4	0.002	Significant	
	Moderate level hospital hazards control	14	25	49	56.3	48	51.1					
	High level	21	37.5	22	25.3	19	20.2					

hospital hazards control											
The proportion of hazards cases among health workers and workers opinion of workplace safety measures											
Workers opinion of workplace safety measures	Poor level opinion	36	45.6	16	20.8	12	14.8	24.147a	4	0	Significant
	Moderate level opinion	25	31.6	44	57.1	42	51.9				
	High level opinion	18	22.8	17	22.1	27	33.3				
The proportion of hazards cases among health workers and Categories of health care professionals											
Health care professionals	Medical Professionals	30	19.1	83	52.9	44	28	14.969a	2	0.001	Significant
	Allied / Para medicals	34	42.5	28	35	18	22.5				
The proportion of hazards cases among health workers and health facility safety responsibilities											
Health Facility Safety Responsibility	Poor level safety responsibility	23	24	26	42.6	15	18.8	11.079a	4	0.026	Significant
	Moderate level safety responsibility	46	47.9	24	39.3	41	51.3				
	High level safety responsibility	27	28.1	11	18	24	30				

Further statistical analysis to determine the real factor that influence the hazards cases in the study findings from multinomial analysis showed two variables that are statistically significant. The respondents' professional categories comprising the medical group with (p-value = 0.016 < 0.05) and Poor safety measures with (p-value = 0.022 < 0.05) respectively. Also statistically significant is Poor hospital hazards Elimination and control with (p-value = 0.002 < 0.05). (table 4.12).

Table 4.12: Result of Multinomial analysis on the relationship between the proportion of hazards cases among health workers in the health facility and other study variables

Parameter Estimates							95% Confidence Interval for		
The Proportion of hazards cases among workers in the health facility (2015 to 2016)							Exp(B)		
	B	Std. Error	Wald	df		Exp (B)	Lower Bound	Upper Bound	
Low prop. of hazards cases									
	Intercept	-0.175	0.624	0.079	1	0.779			
	Low safety Compliance responsibility	0.14	0.467	0.09	1	0.764	1.151	0.46	
	Moderate safety Compliance responsibility	0.986	0.522	3.568	1	0.059	2.681	0.964	
	Medical professionals	-0.996	0.413	5.814	1	0.016	0.369	0.164	
	Poor safety measures	1.13	0.492	5.276	1	0.022	3.096	1.18	
	Moderate safety measures opinion	0.631	0.522	1.458	1	0.227	1.879	0.675	
	Poor hospital hazards Elimination and control	-0.044	0.481	0.008	1	0.927	0.957	0.373	
	Moderate hospital hazards Elimination and control	0.024	0.496	0.002	1	0.961	1.025	0.387	
Moderate prop. of hazards cases									
	Intercept	0.675	0.529	1.632	1	0.201			
	Low safety Compliance responsibility	-0.079	0.378	0.044	1	0.834	0.924	0.44	
	Moderate safety Compliance responsibility	0.333	0.469	0.505	1	0.477	1.396	0.556	
	Medical professionals	0.16	0.378	0.18	1	0.671	1.174	0.559	
	Poor safety measures opinion	-0.11	0.427	0.066	1	0.797	0.896	0.388	
	Moderate safety measures opinion	0.694	0.4	3.003	1	0.083	2.001	0.913	
	Poor hospital hazards Elimination and control	-1.422	0.454	9.825	1	0.002	0.241	0.099	
	Moderate hospital hazards Elimination and control	-0.128	0.397	0.104	1	0.747	0.88	0.404	

a The reference category is: High proportion of hazards cases among workers.

b This parameter is set to zero because it is redundant.

The proportion of occupational hazards health outcomes among the health care workers in health facilities in Kigali Rwanda.

The study findings on the most prevalent occupational hazards health outcomes as was identified by the study participants based on diagnosis and treatment in the years 2015 to 2016 showed that backache accounting for about 142 (60%, 95% C. I.= 53.37 - 66.21) and lung disease 50 (21.1%, 95% C. I.= 16.08 - 26.85). In like manner, Cancer cases was about 13 (5.5%, 95% C. I. =02.95 - 09.19) and Asthma 12 (5.1%, 95% C. I= 02.64 - 08.68) had the least prevalence as observed in the study. (table 4.13).

Table4.13: Proportion of occupational hazards health outcomes among health worker in the health facility (2015 – 2016)

Question on Proportion of Occupational health hazard outcome cases in health facility	Yes			No		
	Prop.	%	95% Confidence Intervals	Prop.	%	95% Confidence Intervals
Backache	142	60	(53.37 - 66.21)	95	40.1	(33.79 - 46.63)
Lung disease	50	21.1	(16.08 - 26.85)	187	78.9	(73.15 - 83.92)
Over time with Stress	38	16	(11.60 - 21.34)	199	84	(78.66 - 88.39)
High blood pressure	36	15.2	(10.87 - 20.40)	201	84.8	(79.59 - 89.13)
AIDS	14	5.9	(03.27 - 09.71)	223	94.1	(90.29 - 96.73)
Cancer	13	5.5	(02.95 - 09.19)	224	94.5	(90.80 - 97.05)
Asthma	12	5.1	(02.64 - 08.68)	225	94.9	(91.32 - 97.36)

Findings from the chi-square test of association between the occupational hazards health outcomes and the institutional associated factors based on respondents' responses showed A significant relationship with Asthma with (p – value = 0.03< 0.05) (table 4.14).

Table4.14: The chi-square test of association between occupational health hazard outcome cases in health facility and human associated factors (0.05 significant levels).

Occupational health hazard outcome cases in health facility	Human associated factors						Chi-square	d f	P -value
	Low grade human factor		Medium grade human factor		Higher grade human factor				
	Yes	%	Yes	%	Yes	%			
Backache	35	24.6	38	26.8	69	48.6	2.843a	2	0.241
High blood Pressure	13	36.1	8	22.2	15	41.7	2.689a	2	0.261
Over time with stress	12	31.6	8	21.1	18	47.4	1.894a	2	0.388
Asthma	7	58.3	2	16.7	3	25	7.026a	2	0.03
Cancer	2	53.8	2	15.4	4	30.8	5.766a	2	0.056
AIDS	5	35.7	4	28.6	5	35.7	.833a	2	0.659

To assess relationships between occupational hazards health outcomes in the hospital and the health care workers using Chi-square and 0.05 statistical significant, the response findings showed that there is a significant relationship with backache with (p- values =.005<0.05) among the Workers in the Health facility. (table 4.15).

Table4.15: The relationships between Occupational hazards health outcomes and the health care workers in the health facilities (0.05 significant levels)

Respondent Profession	Backache		AIDS		High blood pressure,		Asthma		Lung Disease		Cancer		Over Time with stress	
	Yes / %	Chisq uare	Yes / %	Chisq uare	Yes / %	Chisq uare	Yes / %	Chisq uare	Yes / %	Chisq uare	Yes / %	Chisq uare	Yes / %	Chisq uare
Medical Doctor	15 10.6		0 0.00		3 8.3		0 0.00		2 4.0		0 0.00		4 10.5	
Nurse	43 30.3	31.36	7 5.0	19.34	12 33.3	9.435	4 33.3	15.21	22 44.0	15.15	4 30.8	13.99	26.3	14.20
Midwife	25 17.6	17.0a	1 5.0	7a	8 22.2		1 8.3		4 8.0	3a	1 7.7	8a	3 7.9	3a
Dentist	5 3.5		0 0.00		1 2.8		0 0.00		1 2.0		0 0.00		0 0.0	
Laboratory Technician / Scientist	1 0.7	d.f	0 0.00	d.f	0 0.00	d f	0 0.00	d f	0 0.00	d f	0 0.00	d f	0 0.0	d f
Pharmacist / Pharmacy Technician	0 0.00	14	0 0.00	14	0 0.00	14	0 0.00	14	1 2.0	14	0 0.00	14	0 0.0	14

Anaesthetists / theatre worker	8 5.6	0 0.00	0 0.00	0 0.00	0 0.00	1 2.0	1 7.7	1 4	2 5.3					
Potter / Cleaner	30 21.1 2	1 7.1	6 16.7	4 33.3	10 20.0	20 30.8 0	12 31.6							
Mortician	1.4	P- value	0 0.00	P- value	1 2.8	P- value	0 0.00	P- value	1 2.00	P- value	0 0.00	P- value	0 0.0	P- value
Workers in the sterilizing Unit	6 4. 2 2	2 14.3	2 5.6	0 0.00	3 6.0	0 0.00	3 7.9							
Maintenance Staff	1.4	1 7.1	1 2.8	1 8.3	1 2.0	1 7.7	3 7.9							
Occupational health / waste management Staff	3 2.1 1	0.005	1 7.1	0.152	1 2.8	0.802	1 8.3	0.364	1 2.0	0.368	1 7.7	0.45	0 0.0	0.435
Radiology Staff	0.7	0 0.00	0 0.00	0 0.00	0 0.00	1 2.0	0 0.00	0 0.00	0 0.0					
Laundry Staff	1 0.7	1 7.1	1 2.8	1 8.3	2 4.0	1 7	7. 2.6							

Also the study findings on the relationships between occupational hazards cases among health workers in the hospital using Chi-square test at 0.05 statistical significant, findings show that there is a significant relationship with Slips and falls with (p- values =.002<0.05) and Confined space with (p- values =.004<0.05) among the health care workers in the Health facility. (table 4.16).

Table4.16: The relationships between Occupational hazards cases and the health care workers in the health facilities (0.05 significant levels).

Occupational hazards cases in health facility	Working accident		Slips and falls		Injury with blood borne		Hazardous waste contamination		Confined space		Chemical splash		Violence and molestation	
	Yes	Chisq	Yes	Chisq	Yes	Chisq	Yes	Chisq	Yes	Chisq	Yes	Chisq	Yes	Chisq
Respondent Profession	/ %	ue	%	ue	%	ue	%	ue	%	ue	%	ue	%	ue
Medical Doctor	10.38		3.7		6.7		3.0		2.9		0.0		0.0	
Nurse	28.6	13.22	25.8	26.85	24.4	20.05	22.0	24.12	17.1	15.38	25.0	22.98	37.5	15.08
Midwife	15.8		14.6		21.8		8.0		19.5		1.5		12.5	
Dentist	5.38		0.0		3.38		0.0		1.24		1.5		0.0	
Laboratory Technician / Scientist	4.3	d f	1.2	d f	3.38	d f	0.0	d f	1.24	d f	0.0	d f	0.0	d f
Pharmacist / Pharmacy Technician	1.08		1.2		1.3		0.0		2.4		0.0		0.0	
Anaesthetists / theatre worker	7.53		3.7		5.64		8.0		1.24		0.0		0.0	
Potter / Cleaner	31.23		32.9		16.7		38.0		22.0		30.0		25.0	
Mortician	1.08	P val ue	3.7	P val ue	1.3	P val ue	2.0	P val ue	2.4	P val ue	5.0	P val ue	0.0	P val ue
Workers in the sterilizing Unit	6.45		6.1		6.4		6.0		9.8		10.0		0.0	
Maintenance Staff	5.38	0.09	3.7	0.02	3.38	0.28	4.0	0.44	2.48	0.52	15.0	0.61	12.5	0.72
Occupational health / waste management Staff	1.08		0.0		0.0		0.0		2.4		0.0		0.0	
Radiology Staff	1.08		1.2		0.0		1.2		2.4		0.0		0.0	
Laundry Staff	2.15		1.2		2.6		4.0		4.9		1.5		12.5	

Furthermore, test association between health institutional factors and proportion of occupational hazards health outcomes with chi –square test of statistical association at level of 0.05 (p –value) the outcome findings show that Backache and High blood Pressure appear to have statistical association with (p – value = 0.045 < 0.05) and (p – value = 0.01 < 0.05) respectively. (table 4.17).

Table 4.17: The Chi-square test on relationship between categories of the proportion of hazard cases and other influencing variables in the study.

Occupational hazard health outcome cases in health facility	Health institution associated factors						Chi-square	d f	P -value
	Low grade human factor		Medium grade human factor		Higher grade human factor				
	Yes	%	Yes	%	Yes	%			
Backache	26	18.3	60	42.3	56	39.4	6.180a	2	0.045
High blood Pressure	10	27.8	19	52.8	7	19.4	8.099a	2	0.017
Over time with stress	9	23.7	14	36.8	15	39.5	.028a	2	0.986
Asthma	4	33.3	6	50	2	17.7	2.999a	2	0.223
Cancer	4	30.8	5	38.5	4	30.8	.718a	2	0.698
AIDS	3	21.4	5	35.7	6	42.9	.036a	2	0.982

Further analysis with multinomial regression analysis on influencing variables to proportion of the health outcomes cases in the study showed that hospital safety compliance responsibility was significant (p –value 0.004>0.05), also significant was the pre and post exposure safety practices(p –value 0.015>0.05) and workers participation in hospital safety program (p –value 0.043>0.05), (table 4.18).

Table 4.18: The result of multinomial regression analysis on influencing variables to proportion of the health outcomes cases in the study

Parameter Estimates		B	Std. Error	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Low occupational hazard health outcome	Intercept	-0.395	0.542	1	0.466			
	[institution problems=1.00]	-0.144	0.505	1	0.775	0.866	0.322	2.327
	[institution problems=2.00]	0.817	0.469	1	0.081	2.265	0.903	5.679
	[Health facility waste=1.00]	-0.27	0.536	1	0.615	0.764	0.267	2.185
	[Health facility waste=2.00]	-0.598	0.464	1	0.198	0.55	0.221	1.366
	[Policy compliance=1.00]	-0.073	0.49	1	0.881	0.929	0.356	2.426
	[Policy compliance=2.00]	0.237	0.43	1	0.582	1.268	0.545	2.945
	[Compliance responsibility=1.00]	-1.524	0.528	1	0.004	0.218	0.077	0.612
	[Compliance responsibility=2.00]	0.332	0.501	1	0.508	1.394	0.522	3.723
	[Practice PEP=1.00]	1.244	0.526	1	0.018	3.47	1.237	9.737
	[Practice PEP=2.00]	1.156	0.476	1	0.015	3.178	1.251	8.071
	[Workers participation=1.00]	1.266	0.624	1	0.043	3.545	1.043	12.055
	[Workers participation=2.00]	-0.642	0.456	1	0.159	0.526	0.215	1.287
	Moderate occupational hazard health outcomes	Intercept	-0.232	0.489	1	0.635		
[institution problems=1.00]		0.042	0.455	1	0.926	1.043	0.427	2.546
[institution problems=2.00]		0.48	0.417	1	0.251	1.615	0.713	3.661
[Health facility waste=1.00]		-0.533	0.497	1	0.283	0.587	0.221	1.554
[Health facility waste=2.00]		0.064	0.407	1	0.876	1.066	0.48	2.366
[Policy compliance=1.00]		-0.319	0.44	1	0.469	0.727	0.307	1.723
[Policy compliance=2.00]		-0.222	0.389	1	0.569	0.801	0.374	1.717
[Compliance responsibility=1.00]		-0.316	0.424	1	0.457	0.729	0.317	1.676
[Compliance responsibility=2.00]		0.116	0.474	1	0.806	1.123	0.444	2.843
[Practice PEP=1.00]		0.304	0.482	1	0.529	1.355	0.527	3.483
[Practice PEP=2.00]		0.981	0.401	1	0.014	2.667	1.216	5.847
[Workers participation=1.00]		0.991	0.598	1	0.097	2.694	0.835	8.692
[Workers participation=2.00]		0.148	0.391	1	0.706	1.159	0.539	2.495

a The reference category is: High Proportion of occupational hazard health outcomes.
b This parameter is set to zero because it is redundant.

4.3 Different types of occupational hazards cases that exist in the health facilities in Kigali Rwanda.

The participants in the study tried to identify different types of occupational hazards that occur in the health facilities with the following outcome results; working accident and injury with blood borne topping the list with about 204 (86.1%, 95% C. I. = 81.01 – 90.22) and 138 (58.2%, 95% C. I. = 51.67 – 64.58) respectively. While confined space and assault and abuse occupy the bottom position with the least responses of about 64 (27%, 95% C. I. = 21.46 – 33.13) and 63 (26.6%, 95% C. I. = 21.07 - 32.69). (table 4.19).

Table 4.19: Different types of occupational hazards cases that exist in the health facilities in Kigali Rwanda

Question on Types of Occupational hazards cases experienced in health facility	Yes			No		
	Prop .	%	95% Confidence Intervals	Prop .	%	95% Confidence Intervals
Working accidents	204	86.1	(81.01 - 90.22)	33	13.9	(09.78 - 18.99)
Injury with Blood borne	138	58.2	(51.67 - 64.58)	99	41.8	(35.42 - 48.33)
Insect and animal bites	95	40.1	(33.79 - 46.63)	142	59.9	(53.37 - 66.21)
Contagious Waste hazards	91	38.4	(32.17 - 44.91)	146	61.6	(55.09 - 67.83)
Fire outbreaks with burns	76	32.1	(26.17 - 38.42)	161	67.9	(61.58 - 73.83)
Violence and assault	71	30	(24.20 - 36.23)	166	70	(63.77 - 75.80)
Chemicals splash	70	29.5	(23.81 - 35.79)	167	70.5	(64.21 - 76.19)
Confined spaces	64	27	(21.46 - 33.13)	173	73	(66.87 - 78.54)
Assault and abuses	63	26.6	(21.07 - 32.69)	174	73.4	(67.31 - 78.93)

Different types of occupational hazards cases that exist in the health facilities in Kigali Rwanda.

The participants in the study tried to identify different types of occupational hazards that occur in the health facilities with the following outcome results; Cuts and tissue damage and neck pain, body pain and back pain topping the list with about 189 (79.7%, 95% C. I. = 74.06 - 84.67), 175 (73.8%, 95% C. I. = 67.77 - 79.32), 166 (70%, 95% C. I. = 63.77 - 75.80) and 151 (63.7%, 95% C. I. = 57.24 - 69.84) respectively. While Burn out from work pressure occupy the bottom position with the least responses of about 52 (21.9%, 95% C. I. = 16.84 - 27.76) response. (table 4.20).

Table 4.20: The different types of occupational hazards health outcomes cases that exist in the health facilities in Kigali Rwanda.

Question on Types of Occupational hazards health outcomes experienced in health facility	Yes Pro p.	%	95% Confidence Intervals	No Prop.	%	95% Confidence Intervals
Cuts and tissue damage	189	79.7	(74.06 - 84.67)	48	20.3	(15.33 - 25.94)
Neck pain	175	73.8	(67.77 - 79.32)	62	26.2	(20.68 - 32.24)
Body pain	166	70	(63.77 - 75.80)	71	30	(24.20 - 30.23)
Back pain	151	63.7	(57.24 - 69.84)	86	36.3	(30.16 - 42.76)
Stress / Psychosocial problems	142	59.9	(53.37 - 66.21)	95	40.1	(33.79 - 46.63)
Injuries, cuts and fracture	139	58.6	(52.09 - 64.99)	98	41.4	(35.01 - 47.91)
Blood borne infection	138	58.2	(51.67 - 64.58)	99	41.8	(35.42 - 48.33)
Sprain	132	55.7	(49.12 - 62.12)	105	44.3	(37.88 - 62.54)
Allergic reaction to skin, eye	114	48.1	(41.59 - 54.66)	123	51.9	(45.34 - 58.41)
Air burn infection	104	43.9	(37.46 - 50.45)	133	56.1	(49.55 - 62.54)
Asthma and Tuberculosis	98	41.4	(35.01 - 47.91)	139	58.6	(52.09 - 64.00)
Allergic reaction to the body	93	39.2	(32.98 - 45.77)	144	60.8	(54.23 - 67.02)
Allergic reaction and poisoning	91	38.4	(32.17 - 44.91)	146	61.6	(55.09 - 67.83)
Burn out from work pressure	52	21.9	(16.84 - 27.76)	185	78.1	(72.24 - 83.16)

4.4 The human level associated factors to occupational hazards and health outcomes in the health facilities in Kigali;

The study findings indicated that out of 237 study participants about 124 (52.3%) and 119 (50.2%) agrees that negligence of safety procedure, hygiene rules and carelessness and Poor knowledge on use of protective and safety equipment are part of human associated influencing occupational hazards and health outcomes. Lastly, about 87(36.7%) and 51 (24.1%) participants responses agree that lacks of job motivation and Multiple job place to improve earning are among the human associated factors influencing occupational hazards and health outcomes in the study. (table 4.21).

Table4.21: The human level associated factors to occupational hazards and health outcomes (n-237)

Human factors associated with Occupational hazards and health outcome	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	Yes Pro p.	%	Yes Pro p.	%	Yes Prop .	%	Yes Prop. %	%	Yes Prop .	%
Negligence of safety procedures, hygiene rules and carelessness	15	6.3	25	10.5	35	14.8	124	52.3	38	16
Poor knowledge on use of protective and safety equipment	12	5.1	22	9.3	38	16	119	50.2	46	19.4
Poor job training, skill and experience	12	5.1	26	11	62	26.2	94	39.7	43	18.1
Sensitivity Body sensitivity and reaction to some medical devices	19	8	33	13.9	96	40.5	69	29.1	20	8.4
Distraction with other personal issues	28	11.8	33	13.9	75	31.6	88	37.1	13	5.5
Lack of job motivation	29	12.2	45	19	57	24.1	87	36.7	19	8
Absence of insurance cover	35	14.5	61	25.7	60	25.3	64	27	17	7.2
Multiple job place to improve earning	31	13.1	68	28.7	63	26.6	57	24.1	18	7.6

Progressing further in analysis, to assess relationships between study variables using Chi-square at 0.05 statistical significant, result finding showed that there is a significant relationship between the human associated factors and Occupational health and safety practices (p- values =.000<0.05). Also significant are Practice of post exposure safety compliance (p- values = .000 <0.05) and Workers opinion of workplace hazards with (p- values = .000 <0.05) and (p- values = .008 <0.05) respectively. In addition to variables that are significant include; Respondents' level of completed education and Workers participation in workplace safety programs with findings that showed (p- values = .001<0.05) and (p- values = .000<0.05). (table 4.22).

Table4.22: The relationship between the human associated factors and other study variables at level of 0.05 significant).n = 237

Influencing item variables	Human related associated factors							Chi - square	d. f	P- value	Interpretation
	Low Proportion		Moderate Prop.		High Prop.						
	Yes Prop.	%	Yes Prop.	%	Yes Prop.	%					
The relationship between human associated factors and gender of the respondent											
Gender	30.										
Male	25	25.3	30	3	44	44.4	.023a	2	0.989	Not significant	
Female	36	26.1	41	7	61	44.2					
Human associated factors and Occupational health and safety practices											
Occupational health and safety practices	37.										
Poor OHS practices	25	21.2	25	3	11	21.2	21.319a	4	0	Significant	
Moderate OHS practices	26	22	20	9	25	48.1					
High OSH practices	67	56.8	22	8	16	30.8					
The relationship between human associated factors and practice of post exposure safety compliance											
Practice of post exposure safety compliance	25.										
Poor PEP practices	27	37	26	8	8	10.7	29.266a	4	0	Significant	
Moderate PEP practices	10	13.7	23	8	8	50.7					
High PEP practices	36	49.3	40	9	9	38.7					
The relationship between human associated factors and Respondents' level of awareness of workplace hazards											
Respondents' level of awareness of workplace	38.										
Poor awareness of hazards	1	27.5	16	19	30	30.3	6.877a	4	0.143	Not significant	
Poor awareness of workplace hazards	1	20.4	32	1	28	28.3					

Occupational hazards	Poor awareness of workplace hazards	28	51.9	36	42.9	41	41.4				
The relationship between human associated factors and workers opinion of workplace hazards											
Workers opinion of workplace hazards	Poor opinion of workplace hazards	31	39.2	19	24.7	1	13.6				
	Moderate opinion of workplace hazards	19	24.9	23	29.9	2	35.9	13.906a	4	0.008	Significant
	Poor opinion of workplace hazards	29	36.7	35	45.5	4	50.1				
The relationship between human associated factors and Respondents' level of completed education											
Respondents' level of completed education	No formal education	1	33.3	2	66.7	0	0				
	Primary education	9	23.7	20	52.6	9	23.7				
	Secondary Education	14	27.3	20	35.7	2	39.3	29.232a	1	0.001	Significant
	Diploma	29	41.4	25	35.7	10	48.1				
	Degree level	4	14.3	3	10.7	1	7.5				
	Post graduate	4	50.0	1	12.5	3	37.5				
The relationship between human associated factors and level of workers participation in workplace safety programs											
Workers participation in workplace safety programs	Poor safety participation	2	41.4	7	29.3	10	11.6				
	Moderate safety participation	8	13.8	1	33.3	32	37.2	21.330a	4	0	Significant
	High safety participation	2	44.8	3	37.6	44	51.1				

In addition, further statistical analysis was carried out to determine the real factor among the study variables that influence the human associated factors in occupational hazards in the study. Meanwhile, the study findings from multinomial analysis showed four variables that are statistically significant. The institutional associated factors with (p- value = 0.00 < 0.05) and Safety measures opinion among health care workers with (p- value = 0.00 < 0.05) were statistically significant respectively. Also statistically significant is the Practices of post exposure safety compliance with (p- value = 0.047 < 0.05).and Masaka health facility with (p- value = 0.005 < 0.05). (table 4.23).

Table 4.23: Result of Multinomial analysis on the relationship between the human associated factors occupational hazards and health outcomes among health workers in the health facility and other study variables

		Parameter Estimates						
Human associated factors ^a		B	Std. Error	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
low grade human factor	Intercept	-1.102	1.341	1	.411			
	[Factors influence policy=1.00]	.029	.562	1	.959	1.029	.342	3.098
	[Factors influence policy =2.00]	-.845	.552	1	.126	.430	.145	1.268
	[institution problems=1.00]	3.108	.604	1	.000	22.384	6.846	73.185
	[institution problems=2.00]	1.076	.568	1	.058	2.933	.963	8.926
	[Practice PEP=1.00]	.330	.672	1	.623	1.391	.373	5.188
	[Practice PEP=2.00]	.986	.616	1	.110	2.679	.801	8.967
	[Safety measures opinion=1.00]	2.143	.609	1	.000	8.521	2.583	28.109
	[Safety measures opinion=2.00]	.902	.581	1	.120	2.466	.790	7.694
	[Safety programs=1.00]	-.135	.675	1	.842	.874	.233	3.279
	[Safety programs=2.00]	.543	.602	1	.367	1.720	.529	5.598
	[Facility=Kibagabaga]	-.995	.562	1	.077	.370	.123	1.113
	[Facility=Masaka]	-1.491	.532	1	.005	.225	.079	.639
Medium grade human factor	Intercept	-1.029	1.491	1	.490			
	[Factors influence policy =1.00]	.195	.506	1	.699	1.216	.451	3.277
	[Factors influence policy =2.00]	-.407	.445	1	.361	.666	.278	1.594
	[institution problems=1.00]	.336	.574	1	.559	1.399	.454	4.306
	[institution problems=2.00]	.960	.408	1	.019	2.613	1.174	5.812
	[Practice PEP=1.00]	-1.074	.541	1	.047	.341	.118	.986
	[Practice PEP=2.00]	-.666	.428	1	.120	.514	.222	1.189
	[Safety measures opinion=1.00]	.313	.501	1	.532	1.368	.512	3.652
	[Safety measures opinion=2.00]	-.077	.460	1	.867	.926	.375	2.282
	[Safety programs=1.00]	.093	.520	1	.858	1.097	.396	3.038
	[Safety programs=2.00]	.190	.454	1	.676	1.209	.496	2.945
	[Facility=Kibagabaga]	-.326	.463	1	.481	.721	.291	1.789
	[Facility=Masaka]	-.826	.463	1	.075	.438	.177	1.085

a. The reference category is: Higher grade human factor.

b. This parameter is set to zero because it is redundant.

4.5 Health institution associated factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali

The Study findings on health institution associated factors influencing occupational hazards and health outcomes; indicated that out of 237 responses about 120 (48.2%) agrees that among these influencing factors to be constant work over load and extended work time due to shortage of staff. Another, 103(41.4%) agrees that poor infrastructures, housekeeping and hygiene are among the health facility level influencing factor. Also about 93 (37.3%) agrees equally that poor safety information communication and hazard reporting system and insufficient job safety training 86 (34.5%) are among the health facility level influencing factor. (table 4.24).

Table 4.24: Distribution of participants' responses on Health institution associated factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali

Institution factors associated with Occupational hazards and health outcome	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree		
	Yes Pro p.	%	Yes Pro p.	%	Yes Pro p.	%	Yes Pro p.	%	Yes Pro p.	%	
Constant work over load and extended work time due to shortage of staff	16	6.8	2	9.3	52	21.9	10	9	46	38	16
Strict housekeeping and personal hygiene	28	11.8	4	1.7	51	21.5	92	38.8	8	21	8.9
Unclear procedure rules and absence of job supervision	26	11	4	1.7	82	34.6	71	30	16	6.8	6.8
Poor equipment's maintenance system	40	16.9	5	2.1	70	29.5	56	23.6	6	12	5.9
Absence of Fire emergency drills and safety equipment's	34	14.3	5	2.1	70	29.5	71	30	12	5.1	5.1
Poor safety information communication and hazard reporting	19	8	3	1.3	71	30	86	36	3	23	9.7
Insufficient job safety training	16	6.8	7	2.9	80	33.8	79	33	3	15	6.3
Breakdown of safety policy	20	8.4	2	0.8	78	32.9	71	30	16	6.8	6.8
Un responsive health management team	19	8	5	2.1	84	35.4	65	27	4	15	6.3

Further analysis while trying to trace association between study variables at level of significance of 0.05 level of p- value using chi-square test, there was an observed association the institution associated factors and Occupational health and safety practices (p- value = 0.000<0.05) and Practice of post exposure safety compliance (p- value = 0.000<0.05). Also another positive association was observed with Workers participation in safety activities (p- value = 0.000<0.05) and Hospital hazards elimination and control measures (p- value = 0.008<0.05) level of significant. There is equally an observed statistical association between the institution associated factors with Human associated factors with the (p-value = 0.000<0.05) and Health facility safety activities (p- value = 0.000 <0.05) level of significant respectively. (table 4.25).

Table 4.25: Distribution of the relationship between categories of Institution associated factors with occupational hazards and health outcomes and other variables at level of 0.05 significant difference of p-value

Influencing item variables	Health institution related associated factors								Chi - square	d. f	P- value	Interpretation
	Low Proportion		Moderate Prop.		High Prop.		s	e				
	Yes	%	Yes	%	Yes	%			Pro	p.		
Relationship between health institution related factors and occupational health and safety practice												
Occupational health and safety practices	Poor safety practices	34	28.8	29	43.3	5	9.6	20.209a	4	0	Significant	
	Moderate safety practices	30	25.4	19	28.4	24	46.2					
	High safety practices	54	45.8	19	28.4	23	44.2					
Relationship between health institution related factors and Practice of post exposure safety compliance												
Practice of post exposure safety compliance	Poor PEP safety compliance	38	52.1	20	22.5	10	13.3	31.724a	4	0	Significant	
	Moderate PEP safety compliance	11	15.1	32	36.3	30	40.7					
	High PEP safety compliance	24	32.9	37	41.6	35	46.7					
Relationship between health institution related factors and Hazards report system in the health facility												
Hazards report system in	Poor hazards report system	37	30.3	16	22.9	15	33.3	3.498a	4	0.478	Not significant	
	Moderate	37	30.3	26	37.3	10	22.3					

the health facility	level hazards report system	3		1		2							
	High level hazards report system	48	39.	28	40	20	44.						
Relationship between health institution related factors and workers participation in safety activities													
	Poor level workers participation in safety	36	62.	22	7	10	11.						
	Moderate level workers participation in safety	11	19	39	9	23	26.	55.87	4	0	Significant		
Workers participation in safety activities	High level workers participation in safety	11	19	32	4	53	61.						
Relationship between health institution related factors and hospital hazards elimination and control measures													
Hospital hazards elimination and control measures	Poor hazards control measures	18	32.	14	1	36	38.						
	Moderate hazards control measures	13	23.	36	4	24	25.	13.88	4	0.0	Significant		
	High level hazards control measures	25	44.	37	5	34	36.						
Relationship between health institution related factors and human associated factors													
Human associated factors	Poor level human associated factors	38	62.	9	7	21	20						
	Moderate level human associated factors	13	21.	32	1	28	26.	53.25	4	0	Significant		
	High level human associated factors	10	16.	30	3	56	53.						
Relationship between health institution related factors and health facility safety activities													
Health facility safety activities	Poor health facility safety activities	41	51.	14	7	13	16.						
	Moderate health facility safety activities	20	25	27	2	26	33.	31.16	4	0	Significant		
	High health facility safety activities	19	23.	38	1	39	48.						

Another statistical analysis with multinomial analysis was carried out to determine the real factor among the study variables that influence the institution associated factors in occupational hazards and health outcomes with the high categories of the variables placed in constant state as a reference. Findings showed four variables that are statistically significant. The Policy compliance (p- value = 0.05 < 0.05), Safety practices with (p- value = 0.01 < 0.05) and Workers participation in safety programs (p- value = 0.005 < 0.05) were statistically significant respectively. Also statistically significant is Human associated factors (p- value = 0.000 < 0.05). (table 4.26).

Table 4.26: Result of Multinomial analysis on the relationship between the Institutions associated factors occupational hazards and health outcomes among health workers in the health facility and other study variables

Institution associated factors to occupational hazards		95% Confidence Interval for Exp (B)						
		B	Std. Error	d	Sig.	Exp (B)	Lower Bound	Upper Bound
Low grade Institution factor	Intercept	-4.26	1.13	1	0			
	[Policy compliance=1.00]	0.627	0.568	1	0.27	1.871	0.614	5.699
	[Policy compliance=2.00]	1.057	0.547	1	0.05	2.877	0.998	8.293
	[Human factor=1.00]	2.428	0.586	1	0	11.336	3.595	35.743
	[Human factor=2.00]	0.204	0.572	1	0.721	1.226	0.4	3.762
	[Safety practices=1.00]	0.969	0.764	1	0.205	2.635	0.589	11.783
	[Safety practices=2.00]	1.947	0.766	1	0.011	7.009	1.561	31.475
	[Workers participation=1.00]	2.304	0.817	1	0.005	10.014	2.021	49.619
	[Workers participation=2.00]	0.891	0.619	1	0.15	2.439	0.725	8.203
	[Safety programs=1.00]	0.705	0.77	1	0.36	2.023	0.447	9.156
	[Safety programs=2.00]	-0.57	0.637	1	0.433	0.607	0.174	2.115
	[Safety measures opinion=1.00]	0.183	0.581	1	0.752	1.201	0.385	3.747
	[Safety measures opinion=2.00]	0.597	0.588	1	0.31	1.817	0.574	5.753
	Medium grade institution factor	Intercept	-1.99	0.757	1	0.009		
[Policy compliance=1.00]		-0.82	0.557	1	0.142	0.441	0.148	1.316

[Policy compliance=2.00]	0.61 9	0.41 8	1	0.13 9	1.857	0.818	4.215
[Related factor=1.00]	0.80 6	0.55 9	1	0.14 9	2.239	0.749	6.695
[Related factor=2.00]	0.89 7	0.40 7	1	0.02 7	2.451	1.105	5.438
[Safety practices=1.00]	- 0.81	0.46 9	1	0.08 3	0.444	0.177	1.112
[Safety practices=2.00]	- 0.12	0.51 7	1	0.82 5	0.892	0.324	2.457
[Workers participation=1.00]	1.11 2	0.67 4	1	0.09 9	3.04	0.812	11.388
[Workers participation=2.00]	1.01 6	0.39 9	1	0.01 1	2.762	1.263	6.04
[Safety programs=1.00]	0.51 9	0.65 2	1	0.42 6	1.681	0.468	6.035
[Safety programs=2.00]	0.37 3	0.45	1	0.40 8	1.452	0.601	3.509
[Safety measures opinion=1.00]	0.92 1	0.50 3	1	0.06 7	2.512	0.937	6.734
[Safety measures opinion=2.00]	0.58 1	0.45 9	1	0.20 5	1.788	0.728	4.391

a The reference category is: Higher grade institution factor.

b This parameter is set to zero because it is redundant.

4.6 The Medical waste management practices in the health facilities in Kigali, Rwanda.

The study participants responses with regards to how the hospital wastes were handled showed the following responses outcome; about 183 (77.2%, 95% C.I. = 71.34 - 82.40) confirmed that appropriate measures of protection are taken against accidents, also about 171 (72.2%, 95% C.I.=65.98 - 77.76) respondents are aware that there are chemical, physical and biological substances and agents in the workplace which could harm them. About 166 (70%, 95% C.I= 63.77 - 75.80) confirmed that the waste management workers gets safety instructions and training and another 149 (62.9%, 95% C.I=56.38 - 69.04) accepted that the hospital management provides regular supervision of work practices. On the other hand about 119 (50.2%, 95% C.I=43.67 - 56.75) did not accept that the hospital management provides adequate personal protective clothing, another 129 (54.4%, 95% C.I=47.86 - 60.89) did not accept that the health institution conduct research to address emerging health issue (table 4.27).

Table 4.27: The study participants ‘responses with regards to Medical waste management practices in the health facilities (n= 237)

Question on Health facility waste management practices in relation with occupational hazards	Yes Prop.	%	95% Confidence Interval	No Prop.	%	95% Confidence Intervals
Are there appropriate measures of protection taken against accidents	183	77.2	(71.34 - 82.40)	54	22.8	(17.60 - 28.66)
Are there chemical, physical and biological substances and agents under	171	72.2	(65.98 - 77.76)	66	27.8	(22.24 - 34.02)
Do the waste management workers gets safety instructions and training	166	70	(63.77 - 75.80)	71	30	(24.20 - 36.23)
Do the hospital management provides regular supervision of work practices	149	62.9	(56.38 - 69.04)	88	37.1	(30.96 - 43.62)
Respects to hours of work and rest breaks observed in work place	134	56.5	(49.97 - 62.94)	103	43.5	(37.06 - 50.03)
Do they provide first aid for emergency and accidents	124	52.3	(45.76 - 58.83)	113	47.7	(41.17 - 54.24)
Do hospital management provides adequate personal protective clothing	118	49.8	(43.25 - 56.33)	119	50.2	(43.67 - 56.75)
Whether they conduct research to keep track and address emerging health issue	108	45.6	(39.11 - 52.14)	129	54.4	(47.86 - 60.89)

In addition, Further analysis was carried out to trace association between study variables at level of significance of 0.05 level of p- value using chi-square test, there was an observed association with the health facility waste management practices and health facility hazard mitigation strategies with (p- value = 0.000<0.05) and Health

facility safety activities (p- value = 0.000<0.05) level of significant. Also positive association exist with Hospital hazards elimination and control measures (p- value = 0.005<0.05) and Hazards cases reporting system (p- value = 0.013<0.05) level of significant. Found statistically significant is the Participant level of knowledge and awareness of workplace hazards (p- value = 0.001<0.05) and Post exposure safety compliance practices with (p- value = 0.001<0.05). Other variables with positive association are Occupational health and safety practices (p- value = 0.04<0.05) and the Health facility safety responsibility (p-value = 0.000<0.05) level of significant respectively. (table 4.28).

Table 4.28: Distribution of the relationship between the health facility waste management practices and other variables at level of 0.05 significant difference of p-value (A)

Influencing item variables		Categories of Health facility waste management practices						Chi - square	d. f	P- value	Interpretation
		Low Proportion		Moderate Prop.		High Prop.					
		Yes Prop.	%	Yes Prop.	%	Yes Prop.	%				
Relationship between health facility waste management practices and hazard mitigation strategies in the health facility											
Hazard mitigation strategies	Poor Hazard mitigation strategies	36	54.5	25	28.7	14	16.7	28.469a	4	0	Significant
	Moderate Hazard mitigation strategies	18	27.3	42	48.3	37	44				
	High level Hazard mitigation strategies	12	18.2	20	23	33	39.3				
Relationship between health facility waste management practices and health facility safety activities											
Health facility safety activities	Poor safety activities	46	57.5	17	21.5	12	15.4	41.660a	4	0	Significant
	Moderate safety activities	24	30	39	49.4	34	43.6				
	High safety activities	10	12.5	23	29.1	32	41				
The relationship between health facility waste management practices and hospital hazards elimination and control											
Hospital hazards elimination and control	Poor hospital hazard control	14	25	23	26.4	38	40.4	14.762a	4	0.005	Significant
	Moderate hospital hazard control	18	32.1	38	43.7	41	43.6				

measures												
	High hospital hazard control	24	42.9	26	29.9	15	16					
The relationship between health facility waste management practices and different types of hazards cases reporting system												
Hazards cases reporting system	Poor hazards reporting system	50	41	19	27.1	6	13.3					
	Moderate hazards reporting system	43	35.2	31	44.3	23	51.1	12.586a	4	0.013	Significant	
	High hazards reporting system	29	23.8	20	28.6	16	35.6					
The relationship between health facility waste management practices and workers opinion of work place safety												
Workers opinion of work place safety	Poor workers opinion of work place safety	32	40.5	23	29.9	20	24.7					
	Moderate workers opinion of work place safety	27	34.2	29	37.7	41	50.6	7.275a	4	0.122	Not significant	
	High workers opinion of work place safety	20	25.3	25	32.5	20	24.7					
Relationship between health facility waste management practices and Participant level of knowledge and awareness of workplace hazards												
Partic. Knowl. of workplace hazards	Poor Knowl. Moderate Knowledge	17	31.5	18	21.4	40	40.4					
	High knowledge	14	25.9	46	54.8	37	37.4	18.281a	4	0.001	Significant	
		23	42.6	20	23.8	22	22.2					
Relationship between health facility waste management practices and Post exposure safety compliance												
Post exposure safety compl. practices	Poor post exposure safety compliance	37	50.7	22	24.7	16	21.3					
	Moderate post exposure safety compliance	21	28.8	42	47.2	34	45.3	18.306a	4	0.001	Significant	
	High post exposure safety compliance	15	20.5	25	28.1	25	33.3					
The relationship between health facility waste management practices and occupational health and safety practices												
Occupational health and safety practices	Poor safety practices	46	39	14	20.9	15	28.8					
	Moderate safety practices	38	32.2	36	53.7	23	44.2	9.790a	4	0.044	Significant	
	High safety practices	34	28.8	17	25.4	14	26.9					
The relationship between health facility waste management practices and health facility safety responsibility												
Health facility safety responsibility	Poor hospital safety responsibility	47	49	22	36.1	6	7.5					
	Moderate hospital safety responsibility	28	29.2	26	42.6	43	53.8	36.359a	4	0	Significant	
	High hospital safety responsibility	21	21.9	13	21.3	31	38.8					

In addition, there are other variables that are statistically significant in association with the health facility waste management practices, they includes; Human associated factors with (p- value = 0.031<0.05) and institution associated factors with (p- value = 0.00<0.05). Also significant association exist with Factors influencing OSH Policy (p- value = 0.039<0.05) and Level of workers participation in safety programs with (p- value = 0.000<0.05). (table 4.29).

Table 4.29: Distribution of the relationship between the health facility waste management practices and other variables at level of 0.05 significant difference of p-value (B)

Influencing item variables		Categories of Health facility waste management practices						Chi - square	d.f	P- value	Interpretation
		Low Proportion Yes % Prop.		Moderate Prop. Yes % Prop.		High Prop. Yes % Prop.					
The relationship between health facility waste management practices and health institution associated factors											
Health institution associated factors	Poor institution factors	35	51.5	22	30.1	18	18.8	23.509a	4	0	Significant
	Moderate institution factors	22	32.4	25	34.2	50	52.1				
	High institution factors	11	16.2	26	35.6	28	29.2				
The relationship between health facility waste management practices and factors influencing OSH Policy											
Factors influencing OSH Policy	Low policy factors	29	44.6	24	32.9	22	22.2	10.062a	4	0.039	Significant
	Moderate policy factors	20	30.8	28	38.4	49	49.5				
	High policy factors	16	24.6	21	28.8	28	28.3				
The relationship between health facility waste management practices and level of workers participation in safety programs											
Level of workers participation in safety programs	Poor workers participation in safety programs	41	70.7	21	22.6	13	15.1	56.862a	4	0	Significant
	Moderate workers participation in safety programs	11	19	46	49.5	40	46.5				
	High workers participation in safety programs	6	10.3	26	28	33	38.4				
The relationship between health facility waste management practices and human associated factors											
Human associated factors	Low human assoc. factors	29	38.7	18	24	28	37.3	10.663a	4	0.031	Significant
	Moderate human assoc. factors	21	21.6	33	34	43	44.3				
	High human assoc. factors	11	16.9	20	8	34	52.3				

Summary of health facility inspection showed

Three District health facilities are located in an industrial area. The environmental management System is a joint program involving the district and the sector head, there is a documented evidence of environmental Protection Permits. The hospital waste management program details on inspection and interview showed that: hospital waste management are not fully in line with policy rule, there are no evidence of health waste management reduction facility plan and updated document (in case of changes in production technology every five years). The waste management companies have no real program and develop rules on recovery and disposal of the waste.

The hospital waste collected were stored in plastic bin without proper colour mark, same colour are used each week, collection, transportation and disposal are not regular and not in line with policy guide line. The hospital incinerators in three health facilities in the study are not functioning, so the contaminated wastes are transported to another site for disposal (increasing chances of cross infection. There were no provision made in the health facilities for managing and handling liquid wastes, blood and blood products, placenta and other human wastes. The process of waste collection, sorting, marking, storage and transportation are not in line with policy regulation, hence no real structured way. The chemical wastes were disposed in the drainage and no proper form of disposal. The Potters and seen wearing protective apron, boots, gloves and mask while on duty, especially while emptying the bin at the end of the shift per day.

The policy and procedures for medical waste management decontamination are not available in the storage area, though the storage area are kept clean, but still there are rodents around and the location is not near the patients kitchen. The stored wastes are usually cleared within two days of collection but there were no mark or label hinting on the nature of the waste. There were regular water supply for cleaning and hand washing. There was no form of training aid posted as guide for the hospital waste management staff and no first aid facility to handle emergencies. No file

record of update of storage area personnel training and hazard prevention strategies or injury and emergency response procedure. (table 4.30).

Table 4.30: Health facility inspection report

Inspection component	Observation	Recommendation
Location of the Hospital	Kibagabaga was located at the heart of the community it served	Muhima hospital may need to be relocated to a better area with space
	Muhima Hospital was located at business hub of the city	
	Masaka was located at the heart of the serving community	
Environmental Management	The drainages were clean, flowers and tree not outgrown.	May need to find a more appropriate refuse storage sight and a better laundry facility
	The floor were kept clean without litters	
Environmental protection permits	Had an environmental protection permit	Restructure and rebuild hospital incinerator and liquid wastes collection and disposal unit
Health facility environment	Architectural design and engineering details were adequate in relation to ventilation, drainages, fire equipments, trees and connecting pathway to different units	Improvement on hospital temporal waste storage site and improved liquid / human tissue waste management
Waste management	Registered and with contract, there were no waste reduction plan or updates, no existing rule on disposal of waste.	Refer to international guidelines for refuse reduction, sorting, segregation, storage and transportation regulations
	Waste sorting is not carried out	
	waste segregation	
Solid waste	No color-coded waste container, but containers are free from leaking	
	Daily emptying of waste	
	Use of mask and gloves while	

collecting waste

Wastes are stored in a separate container away from wards that sometimes overfills and sometimes litters,

No clearly marked bag for infectious wastes seen

The wastes are collected for disposal in two days.

There are good lighting and water supply in the storage area

Liquid wastes are allowed to drain through the gutters and the central decontaminant tank is spoilt, so the liquid wastes now drains into surrounding hospital neighborhoods.

Redesign the Liquid wastes management in the hospital to avoid contamination to surrounding neighborhood.

Liquid wastes Documentation	No policy and procedure for medical wastes management seen, nor operation manuals for holding and storage of wastes	Review policy guides for handling medical wastes and enforce the practices
Wastes handlers Training	No record of training of wastes handlers and they are recruited on contract basis with some short and long term duration staff. But they are supervised, and supervisors have poor knowledge of risks and risk reduction.	Regular training, appraisal and supervision on the job practices with documentation evidence

Furthermore, to determine the main variables that influences the health facility waste management system, A multi-nominal regression analysis of variables that influences the health facility waste management system showed that there are four variables with an observed statistical relationship between health facility waste management system, they include; hospital policy Compliance responsibility commitment (p-

value = .001 < 0.05) and Human related factors (p- value = .045 < 0.05). Also statistically significant are the Institution problems (p- value = 0.03 < 0.05) and the health facility strategies for elimination of hazards significant is health facility influencing factors (p- value = .009 < 0.05). (table 4.31).

Table 4.31: Distribution of multi-nominal regression analysis of variables influencing waste management system

Parameter Estimates						95% Confidence Interval for Exp(B)				
		B	Std. Error	Wald	df.	Sig.	Exp (B)	Lower Bound	Upper Bound	
Health Facility Waste Practices				11.90						
Poor	Intercept	-3.053	0.885	3	1	0.001				
hospital waste practices	Human Related factor=1	1.154	0.575	4.033	1	0.045	3.172	1.028	9.783	
	Human Related factor=2.	0.598	0.536	1.242	1	0.265	1.818	0.635	5.203	
	Institution problems=1.	0.172	0.628	0.075	1	0.784	1.188	0.347	4.069	
	Institution problems=2.	0.121	0.528	0.052	1	0.819	1.128	0.401	3.178	
	Compliance responsibility=1.	1.976	0.61	8	1	0.001	7.214	2.182	23.852	
	Compliance responsibility=2.	1.655	0.64	6.689	1	0.01	5.234	1.493	18.344	
	Practice PEP=1	-0.478	0.632	0.571	1	0.45	0.62	0.18	2.141	
	Practice PEP=2.	-0.768	0.577	1.771	1	0.183	0.464	0.15	1.438	
	Workers participation=1.	1.404	0.781	3.232	1	0.072	4.071	0.881	18.81	
	Workers participation=2.	0.492	0.561	0.769	1	0.38	1.636	0.545	4.91	
	Safety programs=1.	1.24	0.751	2.728	1	0.099	3.455	0.793	15.044	
	Safety programs=2.	0.109	0.55	0.039	1	0.843	1.115	0.379	3.28	
	Elimination hazards=1.	-0.913	0.6	2.312	1	0.128	0.401	0.124	1.302	
	Elimination hazards=2.	0.232	0.558	0.173	1	0.677	1.261	0.423	3.763	
	Mode	Intercept	0.61	0.571	1.143	1	0.285			
	rate level hospital waste practices	Human Related factor=1.	0.533	0.519	1.055	1	0.304	1.703	0.616	4.707
		Human Related factor=2.	0.452	0.417	1.178	1	0.278	1.572	0.695	3.558
		Institution problems=1.	-0.05	0.553	0.008	1	0.928	0.951	0.322	2.809
Institution problems=2.		-0.897	0.414	4.707	1	0.03	0.408	0.181	0.917	
Compliance responsibility=1.		-0.106	0.438	0.059	1	0.808	0.899	0.381	2.121	
Compliance responsibility=2.		0.166	0.461	0.13	1	0.719	1.181	0.478	2.917	
Practice PEP=1.		-0.344	0.535	0.414	1	0.52	0.709	0.248	2.022	
Practice PEP=2.		-0.039	0.42	0.009	1	0.926	0.962	0.422	2.193	
Workers participation=1.		-0.279	0.742	0.141	1	0.707	0.757	0.177	3.238	
Workers participation=2.		0.256	0.398	0.413	1	0.52	1.291	0.592	2.815	
Safety programs=1.		0.9	0.671	1.8	1	0.18	2.46	0.66	9.164	
Safety programs=2		0.446	0.411	1.18	1	0.277	1.562	0.699	3.493	
Elimination hazards=1		-1.271	0.487	6.826	1	0.009	0.28	0.108	0.728	
Elimination hazards=2.		-0.513	0.444	1.333	1	0.248	0.599	0.251	1.43	

a The reference category is: High level hospital waste practices.

b This parameter is set to zero because it is redundant.

4.7 Hospital management practices on safety policy in relation with occupational hazards

The study findings on the participants' responses on compliance to occupational safety practices in workplace, showed that about 199 (84%, 95% C.I.= 78.66 - 88.40) responses shows acceptance that Health and safety is the joint responsibility of management and worker, about 194(81.9%, 95% C.I.= 76.35 - 86.55) confirms Use of personal protection and safety equipment's meanwhile about 87 (36.7%, 95% C.I.= 30.56 - 43.19) decline to that they have a reporting system for unsafe acts and unsafe conditions and another 87 (36.7%, 95% C.I.= 30.56 - 43.19) also decline that they report any workplace related diseases or illness. (table 4.32).

Table4.32: The proportion of the Participants responses on Hospital management practices on safety policy in relation with occupational hazards (n = 237)

Question on Hospital management practices on safety policy in relation with occupational hazards	Yes Prop.	%	95% Confidence Intervals	No Prop.	%	95% Confidence Intervals
Health and safety is the joint responsibility of management and worker	199	84	(78.66 - 88.40)	38	16	(11.60 - 21.34)
Use of personal protection and safety equipment's	194	81.9	(76.35 - 86.55)	43	18.1	(13.45 - 23.65)
Knowledge of job procedures and doing it	192	81	(75.43 - 85.80)	45	19	(14.19 - 24.57)
Reporting system for sharp injury or falls	180	75.9	(69.99 - 81.25)	57	24.1	(18.75 - 30.01)
Participating in joint health and safety programs	171	72.2	(65.98 - 77.76)	66	27.8	(22.24 - 34.02)
Reporting system for unsafe acts and unsafe conditions	150	63.3	(56.81 - 69.44)	87	36.7	(30.56 - 43.19)
Reporting any workplace related diseases or illness	150	63.3	(56.81 - 69.44)	87	36.7	(30.56 - 43.19)

Compliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals

The study participants’ responses on the level of compliance to safety standards adopted for the protection of health workers based on policy guidelines in hospitals in workplace. Findings showed that about 218 (92%, 95% C.I.= 87.76 - 95.10) are both practicing hand washing after any direct contact with Patient and Safe collection and disposal of sharps equipment’s and safe collection and disposal of sharps respectively. Another 204 (86.1%, 95% C.I.= 81.00 - 90.22) and 198 (83.3%, 95% C.I.= 78.20 -88.03) confirmed from their responses that their health facility always cleaning up spills of blood and other body fluids and dispose of used personal protective equipment safely and comply with disposal of used personal protective equipment safely. (table 4.33).

Table 4.33: The responses of the participants on the level of compliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals

Question on Health facility Compliance to Occupational safety Practices in Workplace	Yes			No		
	Prop	%	95% Confidence Intervals	Prop	%	95% Confidence Intervals
Hand washing after any direct contact with patients	218	92	(87.76 - 95.10)	19	8	(04.89 - 12.24)
Safe collection and disposal of sharps	218	92	(87.76 - 95.10)	19	8	(04.89 - 12.24)
Does your health facility always cleaning up spills of blood and other body fluids	204	86.1	(81.00 - 90.22)	33	13.9	(09.78 - 18.99)
Do you comply with dispose of used personal protective equipment safely	198	83.3	(78.20 -88.03)	39	16.5	(11.97 - 21.80)
Use of Gloves for contact with body fluids, non-intact skin and mucous	197	83.3	(77.73 -87.66)	40	16.9	(12.34 - 22.27)
The health workers always cover all cuts and abrasions sustained during work	194	81.1	(76.35 - 86.55)	43	18.1	(13.45 - 23.65)
Any case / cases of needle stick and sharps injuries in the health facility?	188	79.3	(73.60 - 84.30)	49	20.7	(15.70 - 26.39)
Wearing mask, eye protection or gown when handling blood and other body fluid	180	75.3	(69.99 -81.25)	57	24.7	(18.75 - 30.01)

The Compliance to post exposure universal precautions

Furthermore, findings from the study participants with regards to compliance to post exposure universal precautions showed that about 207 (87.3%, 95% C.I=82.43 - 91.29) accepts that the workers in their health facility are practicing careful handling and disposing of sharp instruments during and after procedures. Also about 201 (84.8%, 95% C.I=79.59 - 89.13) of the respondents gave approval of practice of immediate washing of hands and other skin surfaces after contact with blood. On the other hand, about 111(46.8%, 95% C.I=40.35 - 53.40) respondents' responses showed noncompliance to the re- evaluation of exposed health care workers within 72 hours. (table 4.34).

Table 4.34: Distribution of study Participants responses on Compliance to post exposure universal precautions (n = 237)

Question on Health facility Compliance to post exposure universal precautions	Yes Prop.	%	95% Confidence Intervals	No Prop.	%	95% Confidence Intervals
Carefully handling and disposing of used sharp instruments	207	87.3	(82.43 -91.29)	30	12.7	(08.71 - 17.57)
Immediate washing of hands and other skin surfaces after contact with blood	201	84.8	(79.59 - 89.13)	36	15.2	(10.87 - 20.40)
Are there guidelines outlining all procedures?	192	81	(75.43 - 85.80)	45	19	(14.19 - 24.57)
Any provision of post-exposure prophylactic medication for high-risk employees	168	70.9	(64.65 - 76.59)	69	29.1	(23.41 - 35.35)
Any Support and counseling programs for workers exposed to hazards	163	68.8	62.46 - 74.62)	74	31.2	(25.38 - 37. 54)
People who are at substantial risk for blood borne infections may need pre exposure prophylaxis	155	65.4	(58.97 - 71.44)	82	34.6	(28.56 - 41.03)
Are the workers Immunized against diseases like hepatitis, tuberculosis when working in risk area	153	64.5	(58.10 - 70.64)	84	35.4	(29.36 - 41.89)
Health care personnel's working in risk areas advised to use safety precautionary measure,	148	62.4	(55.97 - 68.63)	89	37.6	(31.37 - 44.05)
Use of Droplet Precautions until patients have received 48 hours of appropriate therapy chemo-prophylaxis	142	59.9	(53.37 - 66.21)	95	40.1	(33.79 - 46.63)
Use of contact Precautions when dealing with contagious cases	137	57.8	(51.24 - 64.17)	100	42.2	(35.83 - 48.76)
Post-exposure activities, especially after additional information about the exposure	136	57.4	(50.81 - 63.76)	101	42.6	(36.24 - 49.18)
Re- evaluation of exposed health care workers is 72 hours	126	53.2	(46.59 - 59.65)	111	46.8	(40.35 - 53.40)

The level of Employee Participation on Occupational health and safety programs in the health facility

The study findings on the proportion respondents' responses on the level of employee participation on occupational health and safety programs in the health facility, the result showed that about 161 (67.9%, 95% C.I.= 61.58 - 73.82) of study participants agree that their health facility have an existing health and safety committee. Another 148 (62.4%, 95% C.I.=55.97 - 68.63) confirms that there are work supervisors that participate in the identification and elimination of workplace hazards. However, about 131 (55.3%, 95% C.I.=48.70 - 61.71) responses showed that the hospital does not carry out any investigations/analyses performed for all accidents resulting in injury, regardless of how minor they may be and reported. Also, about 144 (60.8%, 95% C.I. = 54.23 - 67.02) participants responses did not accept the fact that the health facility offer any health and safety incentive programs another 129 (54.4%, 95% C.I. = 47.85 - 60.89) participants did not accept that the health facility safety committee (s) meet consistently at a regularly Scheduled time. (table 4.35).

Table 4.35: The Distribution of Participants responses with regards to Employee Participation on occupational health and safety (n = 237)

Employee Participation on Occupational health and safety	Yes Prop.	%	95% Confidence Intervals	No Prop.	%	95% Confidence Intervals
Does health facility have a Health and Safety committee?	161	67.9	(61.58 - 73.82)	76	32.1	(26.17 - 38.42)
Are there work supervisors that participate in the identification and elimination of workplace hazards	148	62.4	(55.97 - 68.63)	89	37.6	(31.37 - 44.05)
Are there specific, written, mission statements, goals, contracts language or other document describing functions, duties and authorities of health and safety committee	148	62.4	(55.97 - 68.63)	89	37.6	(31.37 - 44.05)
Do the work supervisors participate in developing or revising health and safety practices and/or policies	129	54.4	(47.86 - 60.89)	108	45.6	(39.11 - 52.14)
Are there formal procedures for employees to report health and safety	128	54	(47.43 - 60.48)	109	46	(39.52 - 52.56)
Are any employees subject to medical surveillance or monitoring for specific hazards (e.g. noise)?	128	54	(47.43 - 60.48)	109	46	(39.52 - 52.56)
Are employees allowed to conduct health and safety activities like training, meetings and accident investigation on work time?	125	52.7	(46.18 - 59.24)	112	47.3	(40.76 - 53.82)
Do workers have clear communication channels for getting health and safety information	121	51.1	(44.50 - 57.58)	116	48.9	(42.42 - 55.49)
Is there a formal "feedback" system for responding to employees' concerns	119	50.2	(43.67 - 56.75)	118	49.8	(43.25 - 56.33)
Are the committee's agendas and minutes distributed to all employees,	118	49.8	(43.25 - 56.33)	119	50.2	(43.67 - 56.75)
Are there special procedures for handling immediate health and safety	118	49.8	(43.25 - 56.33)	119	50.2	(43.67 - 56.75)
Does the health facility safety committee (s) meet consistently at a regularly Scheduled time	108	45.6	(39.11 - 52.14)	129	54.4	(47.85 - 60.89)
Are investigations/analyses performed for all accidents resulting in injury, regardless of how minor they may be and reported	106	44.7	(38.29 - 51.29)	131	55.3	(48.70 - 61.71)
Does the hospital offer any health and safety incentive programs	93	39.2	(32.98 - 45.77)	144	60.8	(54.23 - 67.02)

The Hospital Management and leadership Commitment to safety Policy Guideline

The hospital management level of leadership commitment to safety policy guidelines was among the variables assessed and the resulting responses from the participants accepting that there is a hospital Health and Safety Program me are re-evaluated and/or updated on regular basis as few as 54 (22.8%), n annual health and safety budget designated for safety control measures. Also very few participants 56 (23.6%) agree that there is health and safety signed policy statement that specifically m mention importance of employees. About 72 (30.4%) responses were neutral about the health and safety a formal part of hospital supervisors 'performances evaluation. On another note, about 62 (26.2%) responses disagree to the fact that full-time employees have health and safety as their primary responsibility. (table 4.36).

Table 4.36: The proportion of the participant's responses on hospital management and leadership Commitment to occupational safety Policy Guideline

Questions on Hospital Management and leadership Commitment to safety Policy Guideline	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	Yes Prop.	%	Yes Pro p.	%						
Your hospital Health and Safety Program me are re-evaluated and/or updated on regular basis	38	16	50	21.1	69	29.1	54	22.8	26	11
There is health and safety signed policy statement that specifically mention importance of employees	22	9.3	53	22.4	74	31.2	56	23.6	32	13.5
Does management set formal, annual health and safety goals, communicated via bulletin to employee and other safety staff	28	11.8	61	25.7	76	32.1	42	17.7	30	12.7
There is an annual health and safety budget designated for control measure as opposed to operating expenses	33	13.9	53	22.4	95	40.1	37	15.6	19	8
Health and safety is a formal part of managers' performance evaluations	28	11.8	51	21.5	69	29.1	60	25.3	29	12.2
Is health and safety a formal part of hospital supervisors 'performances evaluation	32	13.5	43	18.1	72	30.4	59	24.9	31	13.1
Full-time employees have health and safety as their primary responsibility as safety professionals	26	11	62	26.2	59	24.9	62	26.2	28	11.8

The study participants' opinion on the factors resulting to poor policy enforcement

Findings from this assessment produced the following result based on the respondent responses on factors resulting to poor policy enforcement; about 105 (44.3 %) believe that there are poor timing of work scheduled and carelessness. Another 107 (45.1%) respondent agreed that the problem may be in relation to poor policy enforcement, while about 103 (43.5%) of the respondents agree that it may be associated with Unsafe working environment and occupational hygiene practices 121 (51.1%). (table 4.37).

Table 4.37: The participants' opinion on Factor resulting to Poor policy enforcement

Questions on Factor resulting to Poor policy enforcement	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
	Yes Pro p.	%	Yes Pro op.	%	Yes Pro op.	%	Yes Pro p.	%	Yes Pro p.	%
	Poor policy implementation and regulation	40	16.9	35	14.8	57	24.1	82	34.6	23
Forgetfulness of the right procedures and distractions	28	11.8	36	15.2	66	27.8	93	39.2	14	5.9
Poor timing of work scheduled and carelessness	19	8	50	21.1	52	21.9	105	44.3	11	4.6
Unsafe working environment	19	8	38	16	57	24.1	103	43.5	20	8.4
Poor policy enforcement system	15	6.3	45	19	52	21.9	107	45.1	18	7.6
Occupational hygiene practices	16	6.8	31	13.1	46	19.4	121	51.1	23	9.7
Others specify?										

The description of the study participants' responses on whether they are satisfied with the occupational safety practices in their health facility.

The findings showed that 66 (26.5 %, 95% C.I= 21.13 – 32.45) of the study participants were neutral on their opinion, about 63 (25.3%, 95% C.I= 20.02 – 31.18)

of the study participants were somewhat dissatisfied and 54 (21.7%, 95% C.I= 16.73 -27.33) study participants were somewhat satisfied. (table 4.38).

Table 4.38: Distribution of participants’ responses on whether they are satisfied with the occupational safety practices in their health facility

Are you satisfied with the occupational safety practices in your health	Freq. / %	95% Confidence Intervals
1. Very satisfied	46 18.5	(13.85 – 23.86)
2. Somewhat satisfied	54 21.7	(16.73 -27.33)
3. Neither dissatisfied nor satisfied	66 26.5	(21.13 – 32.45)
4. Somewhat dissatisfied	63 25.3	(20.02 – 31.18)
5. Very dissatisfied	20 8.0	(4.98 – 12.13)

Some top management administrative staff of the three health facilities were interviewed with a check list and the responses obtained were shown below. The questions tried to see information about the top management’s staff expectations for employees, the hospital environmental status check, co-chair of the safety committee and directly received the quarterly safety committee minutes.

The responses from the top management staff of the three health facilities in the study showed that 6 (66.7%, 95% C. I=29.93 – 92.51) agreed that the top hospital management implements a written policy supporting and mandating the safety and health management system same proportion showed that Top hospital management assigns responsibility and accountability for the implementation and maintenance of the program.

Meanwhile, responses with regards to whether that Hospital management ensures effective communication for workers health and safety goals and expectations was

about 6 (66.7%, 95% C. I.=29.93 – 92.51). On the other hand only 3 out of the 9 hospital management (33.3%, 95% C. I.=07.49 – 70.07) responses showed that everyone in the hospital knows who has been assigned responsibility for the program and Hospital management recognizes employee contributions to worker safety and health at the hospital. Also Hospital management routinely demonstrates visible commitment to the program. (table 4.39).

Table 4.39: Distribution of Top hospital management responses on safety leadership compliance

Management Leadership (n = 9)	Yes	95% Confidence Interval	No	95% Confidence Interval
There is a written policy supporting the safety and health management system.	6 (66.7)	(29.93 – 92.5)	3 (33.3)	(07.49 – 70.1)
The management defines effective worker health and safety goals and expectations.	4 (44.4)	(13.69 – 78.8)	5 (55.6)	(21.20 – 86.3)
They assign responsibility and are accountable for the work and maintenances too.	6 (66.7)	(29.93 – 92.5)	3 (33.3)	(07.49 – 70.1)
Ensures effective communication for workers health and safety goals and expectations.	6 (66.7)	(29.93 – 92.5)	3 (33.3)	(07.49 – 70.1)
Everyone in the hospital knows who has been assigned responsibility for the program.	3 (33.3)	(07.49 – 70.1)	6 (66.7)	(29.93 – 92.5)
Allocates appropriate resources (funds and time) to accomplish goals and manage the program.	4 (44.4)	(13.69 – 78.8)	5 (55.6)	(21.20 – 86.3)
Recognizes employee contributions to worker safety and health at the hospital.	3 (33.3)	(07.49 – 70.1)	6 (66.7)	(29.93 – 92.5)
Routinely demonstrates visible commitment to the safety program.	3 (33.3)	(07.49 – 70.1)	6 (66.7)	(29.93 – 92.5)

In the area of hazard identification in the hospital, the responses from the top management staff of the three health facilities in the study showed that 6 (66.7%,

95% C.I.=29.93 – 92.51) on the Inspection of the hospital physical environment to identify conditions that poses or could pose a worker safety or health concern, also Identifies hazards associated with emergencies and non-routine operations and lastly that Management informs employees of hazards in their work areas.. Response on whether they regularly review written materials such as OSHA logs, workers' complain claims 2, (22.2%, 95% C. I=02.81 – 60.01), Another 3 (33.3%, 95% C.I=07.49 – 70.07) agree that they regularly review written materials on results of workplace inspections and others probably do not. (table 4.40).

Table 4.40: Distribution of hazards identification in the hospital

Hazards identification in the hospital (n = 9)	Yes	95% Confidence Interval	No	95% Confidence Interval
Regularly review of written materials such as OSHA logs and workers' complain claims,	2(22.2)	(02.81 - 60.0)	7(77.8)	(39.99- 97.2)
Review of written materials on results of workplace inspections,	3(33.3)	(07.49 70.01)	6(66.7)	(29.93 – 92.5)
Review of incident investigation reports, and manufacturers' literature to help identify hazards.	4(44.4)	(13.69 – 78.8)	5(55.6)	(21.20 – 86.3)
Inspection of hospital physical environment to identify conditions that poses threat to workers safety.	6 (66.7)	(29.93 – 92.5)	3 (33.3)	(07.49 – 70.1)
Ask employees about hazards and safety concerns in their work areas during rounds.	5 (55.6)	(21.20 – 86.3)	4 (44.4)	(13.69 – 78.8)
Investigates incidents to identify any previously unrecognized hazards.	5(55.6)	(21.20 – 86.3)	4(44.4)	(13.69 – 78.8)
Conducts all inspections and exposure assessments required by OSHA.	4 (44.4)	(13.69 – 78.8)	5(55.6)	(21.20 – 86.3)
Identifies hazards associated with emergencies and non-routine operations.	6 (66.7)	(29.93 – 92.5)	3(33.3)	(07.49 – 70.1)
Informs employees of hazards in their work areas.	6 (66.7)	(29.93 – 92.5)	3 (33.3)	(07.49 – 70.1)
Review all contractor job plans for safety and hazards, prevention, and control.	5 (55.6)	(21.20 – 86.3)	4(44.4)	(13.69 – 78.8)
Receives contractor's complaints on likely hazards provoking situations for mitigation purposes.	5 (55.6)	(21.20 – 86.3)	4 (44.4)	(13.69 – 78.8)
Informs all contractors of the hazards they may encounter during their work on site.	4 (44.4)	(13.69 – 78.8)	5 (55.6)	(21.20 – 86.3)

Presentation of outcome and influencing variables attributes to Health Facility Occupational Safety Responsibility and compliances

Further analysis was carried out to trace association between study variables and health facility occupational safety responsibility and compliances at level of significance of 0.05 level of p- value using chi-square test, there was an observed association with about seven (5) study variables including; the health facility Hazards cases reporting system with (p- value = 0.001<0.05) and Practice of post exposure safety compliance (p- value = 0.000<0.05) level of significant. Also positive association exist with Occupational health and safety practices (p- value = 0.000<0.05) level of significant. Found statistically significant is the Health facility waste practices (p- value = 0.000<0.05) and Health institution associated factors (p- value = 0.01<0.05). (table 4.41).

Table 4.41: The outcome of test association of Health Facility Occupational Safety Responsibility and compliances and other study variables

		Health Facility Occupational Safety Responsibility and compliances						Chi - square	d. f	P- value	Interpretation
Influencing item variables		Low Proportion		Moderate Prop.		High Prop.					
		Yes Prop.	%	Yes Prop.	%	Yes Prop.	%				
The relationship between the health facility safety responsibility and compliances and hazards reporting system											
Hazards cases reporting system	Poor Hazards reporting system	62	50.8	19	27.1	15	33.3	12.363 a	4	0.015	Significant
	Moderate level of hazards reporting system	28	23	22	31.4	11	24.4				
	High hazards reporting system	32	26.2	29	41.4	19	42.2				
The relationship between the health facility safety responsibility and compliances and practice of post exposure safety compliance											
Practice of post exposure safety compliance	Poor practice of PEP	41	56.2	32	36	23	30.7	18.622 a	4	0.001	Significant
	Moderate level practice of PEP	20	27	25	28.1	16	21.3				
	High level practice of PEP	12	16.4	32	36	36	48				
The relationship between the health facility safety responsibility and occupational health and safety practices											
occupational health and safety practices	Poor occupational safety practices	68	57.6	14	20.9	14	26.9	38.668 a	4	0	Significant
	Poor occupational safety practices	25	21.2	27	40.3	9	17.3				
	Poor occupational safety practices	25	21.2	26	38.8	29	55.8				

The relationship between the health facility safety responsibility and occupational hazards mitigation strategies											
Occupational hazards mitigation strategies	Poor hazards mitigation strategies	31	47	33	37.9	3.2	38.1				
	Moderate hazards mitigation strategies	21	31.8	23	26.4	1.7	20.2	7.620a	4	0.107	Not significant
	High level hazards mitigation strategies	14	21.2	31	35.6	3.5	41.7				
The relationship between the health facility safety responsibility and Health institution associated factors											
Health institution associated factors	Low health institution factors	32	47.1	25	34.2	3.9	40.6				
	Moderate health institution factors	24	35.3	15	20.5	2.2	22.9	13.171a	4	0.01	Significant
	High health institution factors	12	17.6	33	45.2	3.5	36.5				
The relationship between the health facility safety responsibility and Health facility waste practices											
Health facility waste practices	Health facility waste practices	47	62.7	28	28.9	1.1	32.3				
	Health facility waste practices	22	29.3	26	26.8	3.1	20	36.359a	4	0	Significant
	Health facility waste practices	6	8.8	43	44.3	1.1	47.7				
The relationship between the health facility safety responsibility and Hospital hazards elimination and control measures											
Hospital hazards elimination and control measure	Poor Hospital hazards control measure	24	42.9	31	35.6	4.1	43.6				
	Moderate hospital hazards control measure	14	25.25	17	19.5	3.0	31.9	9.120a	4	0.058	Not significant
	High hospital hazards control measure	18	32.1	39	44.8	2.3	24.5				
The relationship between the health facility safety responsibility and Human associated factors											
Human associated factors	Poor level human factors	27	44.3	21	29.6	4.8	45.7				
	Moderate level human factors	19	31.1	18	25.4	2.4	22.9	8.425a	4	0.077	Not significant
	High level human factors	15	24.6	32	45.1	3.3	31.4				

In attempt to further determine the real variables in the study that influences the Levels of Compliance in the health facility to occupational safety responsibility and other study variables, A multi-nominal regression analysis of variables showed that there was an observed statistical relationship with five (5) variables in the study; positive association exist with Actions that Influence poor Policy (p- value = .004 < 0.05) and Health facility waste practices (p- value = .002 < 0.05). Also significant is the Hospital management safety practices (p- value = .003 < 0.05) and Health facility

safety programs (p- value = .022 < 0.05). Lastly, workers participation in safety program (p- value = .042 < 0.05). (table 4.42).

Table 4.42: The multinomial distribution of study variables that influence the health facility safety policy compliance responsibility

Parameter Estimates		95% Confidence Interval for Exp(B)						
Factors influencing the health facility safety compliance responsibility		B	Std. Error	d	Sig.	Exp(B)	Lower Bound	Upper Bound
Poor level practices of safety policy compliance responsibilities	Intercept	-2.25	0.643	1	0			
	Action Influence Policy=1.	-0.52	1.279	1	0.683	0.593	0.048	7.273
	Action Influence Policy=2.	1.315	0.453	1	0.004	3.726	1.532	9.057
	Institution problems=1.	-0.15	0.592	1	0.801	0.861	0.27	2.749
	Institution problems=2.	-0.42	0.462	1	0.36	0.656	0.265	1.62
	Health facility waste=1.	1.957	0.637	1	0.002	7.08	2.032	24.661
	Health facility waste=2.	0.128	0.443	1	0.773	1.136	0.477	2.707
	Safety practices=1.	1.556	0.53	1	0.003	4.738	1.675	13.399
	Safety practices=2.	-0.12	0.587	1	0.844	0.891	0.282	2.817
	Practice PEP=1.	-0.21	0.579	1	0.717	0.811	0.261	2.523
	Practice PEP=2.	-0.14	0.483	1	0.777	0.872	0.339	2.245
	Safety programs=1.	0.925	0.573	1	0.106	2.521	0.821	7.745
	Safety programs=2.	1.053	0.458	1	0.022	2.866	1.168	7.032
	Workers participation=1.	1.737	0.854	1	0.042	5.682	1.065	30.323
Workers participation=2.	-0.35	0.438	1	0.426	0.706	0.299	1.664	
Moderate level practices of safety Policy compliance responsibilities	Intercept	-2.26	0.649	1	0.001			
	Action influence Policy=1	1.166	0.879	1	0.185	3.208	0.573	17.966
	Action influence Policy =2.	0.428	0.464	1	0.357	1.534	0.617	3.811
	Institution problems=1.	0.036	0.57	1	0.95	1.037	0.339	3.168
	Institution problems=2.	-0.57	0.486	1	0.242	0.567	0.219	1.469
	Health facility waste=1.	1.927	0.653	1	0.003	6.868	1.909	24.703
	Health facility waste=2.	0.18	0.456	1	0.694	1.197	0.489	2.928
	Safety practices=1.	1.056	0.57	1	0.064	2.873	0.94	8.784
	Safety practices=2.	1.012	0.573	1	0.077	2.752	0.895	8.457
	Practice PEP=1.	-0.1	0.611	1	0.871	0.905	0.273	3
	Practice PEP=2.	0.082	0.476	1	0.864	1.085	0.426	2.761
	Safety programs=1.	0.788	0.559	1	0.159	2.2	0.735	6.58
	Safety programs=2.	0.479	0.465	1	0.303	1.615	0.649	4.017
	Workers participation=1.	1.234	0.873	1	0.158	3.433	0.62	19.02
Workers participation=2.	0.239	0.451	1	0.597	1.27	0.524	3.075	
a The reference category is: High level practices of safety Policy responsibilities.								
b This parameter is set to zero because it is redundant.								

Occupational Health and safety Policy Gap Analysis

The Government of Rwanda has adopted the health facility accreditation system as one of the many strategies to improve quality of care. This is to help institutionalize continuous quality improvement in the day-to-day operations. Therefore, to foster continuous quality in Health facilities, the Ministry of Health has elaborated policies, procedures and guidelines to be followed in service delivery. With the following objectives:

- Contribute to the improvement of efficiency and effectiveness in service delivery;
- Increase a harmonized approach to service delivery, hence improving patient care, quality of services and safety.
- Encourage team work- especially when the policies are crosscutting services.
- Provide guidance tools for orientation of staff and support organizational informed decision making.

In conclusion the following policy gaps were identified from which recommendations were given;

The ILO and WHO safety and hazards control in workplace were not strictly adhered to based practices and incident investigations, report and follow up evidence Unfortunately, there are absence of evidence based practices and report Training gap/ information sharing and training evaluation records were not seen No Smoking of Tobacco Products on Hospital Premises and Taking Alcohol, Abuse of Drugs and Other Substances in District Hospitals But not fully enforced, reported and communicated to attract the desired behaviour change Workplace environmental safety are not fully enforced (Poor equipment maintenance, engineering, poor supply of PPE) these are necessary to prevent hazards .The fire extinguisher though exist but no form of training, fire drill, communication system and emergency intervention plan. No safety guidelines for activities in various departments, Absence of job supervision and evaluation update or incident report.

The forum for dealing with challenges in waste management does not exist and great burden of manual handling and lifting but storage and disposal mechanism are not in line with the policy guide especially for hazardous chemicals.

Safety committee and responsibilities though recently inaugurated, but without real safety activities. No regular meeting, No record of meetings, No investigation on safety related issues, No record of cases.

Occupational Health and safety Policy Gap Analysis

The Government of Rwanda has adopted the health facility accreditation system as one of the many strategies to improve quality of care. This is to help institutionalize continuous quality improvement in the day-to-day operations. Therefore, to foster

continuous quality in Health facilities, the Ministry of Health has elaborated policies, procedures and guidelines to be followed in service delivery. With the following objectives:

- Contribute to the improvement of efficiency and effectiveness in service delivery;
- Increase a harmonized approach to service delivery, hence improving patient care, quality of services and safety.
- Encourage team work- especially when the policies are crosscutting services.
- Provide guidance tools for orientation of staff and support organizational informed decision making.

In conclusion the following policy gaps were identified from which recommendations were given;

The ILO and WHO safety and hazards control in workplace were not strictly adhered to based practices and incident investigations, report and follow up evidence. Unfortunately, there are absence of evidence based practices and report. Training gap/ information sharing and training evaluation records were not seen. No Smoking of Tobacco Products on Hospital Premises and Taking Alcohol, Abuse of Drugs and Other Substances in District Hospitals But not fully enforced, reported and communicated to attract the desired behaviour change. Workplace environmental safety are not fully enforced (Poor equipment maintenance, engineering, poor supply of PPE) these are necessary to prevent hazards. The fire extinguisher though exist but no form of training, fire drill, communication system and emergency intervention plan. No safety guidelines for activities in various departments, Absence of job supervision and evaluation update or incident report.

The forum for dealing with challenges in waste management does not exist and great burden of manual handling and lifting but storage and disposal mechanism are not in line with the policy guide especially for hazardous chemicals.

Safety committee and responsibilities though recently inaugurated, but without real safety activities. No regular meeting, No record of meetings, No investigation on safety related issues, No record of cases. (table 4.43).

Table 4.43: Summary of Policy Implementation and Compliance Gap Analysis

Strategic objectives	Achievement status	Existing Gap/ Challenges	Action plan
Policy provides operational guidance on Negative Incident Reporting,	The three health Facilities in Kigali ,have adopted the policy, they have hospital health and hygiene committee who have the mandate to address incident cases	ILO and WHO clearly provides a guideline frame work on how to handle safety and hazards related events in workplace Unfortunately, there are absence of evidence based practices and incident report	The safety and hygiene committee need to be fully functioning in line with guideline and with evidence based result. Inaugurating the safety committee is not enough but a functional and active committee, with an evidence based documented proof of activities.
Incident Investigation,	Only a fraction of incident cases were investigated to ensure quality assurance, equity in services and risk reduction	There are few incident investigations carried out but no report of the activities or ILO and WHO clearly provides a guideline frame work on how to handle safety and hazards related events in workplace Unfortunately, there are absence of evidence based practices and report	Regular review of incident cases put down strategies for prevention of future occurrence and regular report and updated information and research in relation to occupational health and safety.
Reporting and Handling of Accidents/Injuries While on Duty,	Injection safety strategies, pre-exposure and post exposure treatment and mitigation strategies are fully in practice	Training gap/ information sharing and evaluation	Regular safety and hygiene incident review and evaluation to identify gap, for improvement
No Smoking of Tobacco Products on Hospital Premises and Taking Alcohol, Abuse of Drugs and Other Substances in District Hospitals	Smoking information and warning exist. Also restriction for health personnel to avoid risk to self and others	But not fully enforced, reported and communicated to attract the desired behavior change	Enforcing policy and disease prevention especially to prevent secondary smoking effect
Manual Handling (Lifting of Loads),	Not yet addressed due to poor finance	Participant response of confirms the burden of manual handling and lifting	The need to ensure evidence based insurance cover for treatment and hazard mitigation strategies.
Storage and Labeling	Strict purchase	But storage and disposal	May need to consult

on Flammable Products, Storage of Hazardous Materials and Dangerous Goods, Purchase of Hazardous Materials and Dangerous Goods	operation mechanism exist and proper labeling	mechanism are not in line with the policy guide especially for hazardous chemicals	experts to help out to reduce the environmental and human contamination
Radio and Other Noise Making Devices in Hospital Settings	Strict control measures are fully in place and enforced	No report of incident	Need to keep surveillance and improved communication
Fire Extinguishers Use	Fire mitigation strategies are designed , but not yet fully addressed	The fire extinguisher though exist but no form of training, fire drill, communication system and emergency intervention plan	Experts services may be employed to mitigate incidents
Monitoring Data on Incidents, Injuries and other Events	Great majority of the health practices are carried out without regards to the guidelines..	Weak monitoring, investigation, follow up and absence of incident reports	Improvement through: Training, investing and improvement reporting and research
Hazards and Risk reduction	Little activity	Workplace environmental safety are not enforced, Poor equipment maintenance, engineering, poor supply of PPE that are necessary to prevent hazards	Fund mobilization, improved communication, proper job placement, training, job supervision and motivation
Handling Storage and Disposal of Clinical and other Waste	Contract manager with little experience	No safety guidelines for activities in various departments, Absence of job supervision and evaluation update. The forum for dealing with challenges in waste management	Programs for improved waste management
Safety committee and responsibilities	There are evidence of existence of the safety and hygiene committee in the three health institution	Recently inaugurated, without real safety activities. No regular meeting, No record of meetings, No investigation on safety related issues, No record of cases,	Workers involvement in decision making and a lot of other safety issues.

4.8. Focus group discussion on Occupational health hazards, associated factors and compliance to safety standards

Focus group discussion thematic analysis

Summary of the focus group discussion on Occupational health hazards and health outcomes among health workers, the determinants and compliance to safety standards in the health facilities in Kigali

Site:	Kigali	Moderator:	J. B. N.
Total participants:	Men:4Women:7	Note-taker:	D. N. & A. K. B.
Date:	27/8/2016		
Start time:	2:52 PM	End time:	4:55 PM

Focus group discussion are frequently used and are widely considered a vital tool used to reveal feelings, ideas, perceptions, viewpoints, exchange of ideas, and thinking on a specific issue. Some important information among the determinants of occupational hazards and health outcome and compliance to safety was identified from the focused group discussion and was put forward below:

1. Occupational Health Problems in health facility:

Health facility is a high risk working place, where people are made to work under pressure in attempt to attend to emergency cases and they are easily

exposed to hazards. The health workers are engaged in prolonged task and works which may be overtime hours and night shifts.

Also in some departments where the staff are only one person recruited in the position, he is made to work without break for any form of leave.

In some cases the porters and cleaners are made to carry out tasks that are supposed to be handled by more staff making them vulnerable.

Staff shortage in some department has put job pressure and inability to engage new staff on proper job orientation and training before commencement on duty

2. Determinants and factors associated with Occupational hazards in health facilities and the health outcome.

- Human factors associated with occupational health hazards and the health outcomes in the health facility;

Normally, the midwives, Doctors, Anaesthetist and a lot others are carrying out their work in high risk working environment where they are exposed to infectious diseases like HIV/AIDS, tuberculosis, hepatitis B & C; even if they observe the precautionary measures but are sometimes vulnerable to accidents and hazards and are to take the post-exposure prophylaxis regimen during a period of one month.

- Health institution factors associated with occupational health hazards and the health outcomes in the health facility;

Sometimes, there are delays in collection of the waste from hospital and the cleaners are made to assist in packing the collected wastes in sacs for easy evacuation making them vulnerable to hazards. The health facility incinerator are spoilt and yet to be repaired and the newly procured one is yet to be put into use. The transportation of the generated wastes to the

disposal site is delayed for logistic reason and the storage site emits dangerous gas and breeds rodents.

The normal working hours are eight hours per day, 180 hours per month, but the health workers in some departments are made to work for about 200 hours per month, and even 210 hours per month without any form of compensation. In some instances some of the staff are denied their off duty right too.

In like manner, it is becoming difficult for some of the health workers to have their annual leave due to work pressure and staff shortage and no staffs is available to stand in for you when on leave.

In the area of job motivation, little is done to encourage and support the workers who are working so hard, even some of the financial benefits are withheld for long period.

- Work place risks and risk aversion and risk management; Though personal protection equipment are provided in high risk units but there is a lot that need to be done to ensure accident free and risk reduction. If work demand continue to mount and with few staff to take shift duty especially in places like operating theatre, vulnerability is high. There are some health workers who unfortunately became infected with tuberculosis, HIV and Hepatitis B while discharging their duty. They were not well taken care of by the institution and the family of these health workers were not even visited or supported in any way.

3. Types of occupational hazards commonly experienced in the health facility and the categories of health workers affected

- Categories of occupational health hazards commonly experienced by health workers in the health facilities included working accidents, chemical reactions, slippery floor, and prolonged job position (sitting or

standing and bending) exposure to blood borne pathogens, injury and cuts.

- Categories of occupational health outcomes commonly experienced by health workers in the health facilities; burnout from work pressure and stress, high blood pressure, slips and falls, AIDS, respiratory infection, allergies, insect bites, backache and body pain etc.

4. Waste management practices in the health facilities and challenges they face

- Provision of safety protection equipment; The safety equipment's like gloves, boots, mask and gown are provided but sometimes the provisions are not enough to cover all the activities when they run out of supply
- Pre job placement training on health and safety; some time the newly recruited staff are not given proper job orientation and adequate health and safety information to match the job placement. This has made these staff to be vulnerable to hazards. Many staff is yet to receive the right safety training in the workplace.
- Training on occupational health and safety in waste management; the potters and cleaners are not trained on health and safety measures but some guideline are provided. Only the staff in-charge of occupational health and hygiene are trained and they are yet to train others
- Job supervision, monitoring and job evaluation; the potters and cleaners carry out their task without supervision or proper follow up though there are monthly evaluation done and job appraisal carried out in different departments but no specific on job assigned supervisors especially for the potters and cleaners (the head of the team)
- Staff job comfort, motivation and protection from hazard; the staff are not motivated in any way and are engaged in strenuous work without adequate rest hour or leave. At times it takes a long time to replace broken or spoilt equipment
- Health insurance and disability coverage; No form of disability cover but there are health insurance through Mutuelle de sante'

5. The Compliance practices to health and safety by the health workers with regards to the following:

- Compliance health and safety rules: In all the health facilities in the study, there is occupational safety and hygiene committee newly formed and is yet to be fully functioning. The health facility administrators / managers listen to the workers suggestions related to how we work money hours and other relevant issues and report to high level, but the employees do not participate in safety meetings

Also procurement procedures for equipment related to hygiene / waste management are not flexible.

- Enforcement on the Use of PPE; Information on the use of protective equipment are available but not enforced and sometimes staff experience shortage of the equipment and have to improvise while carrying out duties.
- Enforcement of Fire precaution; there are provisions made for fire drill in the health facility but the staff are not trained on how to respond to fire outbreak emergencies in the health facility
- Enforcement on the use of Pre and Post exposure prophylaxis; There are no procedure for pre exposure to hazard except the protective equipment. Staffs that experience working accident are not investigated, but are treated but not followed up or reported and recorded as required. General procedure for post exposure prophylaxis for blood contact are enforced
- Occupational Hazards experience report system: Accident incident reporting system are not in operation as required by international guide line. There is no record of hazards incidents in the three health facilities though there are cases that are well known but are not well investigated, followed up to see what could be learned and averted in future.

- Occupational Hazards records and documentation and research; No updated hazard incident report and recorded cases in the health facility. Also no information about occupational research.
- Occupational hazards that needs to be reported and notified; there are no response on recent notifiable occupational hazards cases

Analysis for the study dependent variables

There are three main dependent variables in this study:

- Levels of Compliance to Safety regulations,
 - Waste management practices
 - The health hazard cases and health outcomes in the health facility.
- i. To determine the main variables that influences the levels of Compliance to Safety regulations, A multi-nominal regression analysis showed that there are five main variables that influences Compliance to Safety regulations in this study: First is the actions that Influence poor policy (p- value = $.004 < 0.05$), Secondly, Health facility waste practices (p- value = $.002 < 0.05$), Thirdly, Hospital management safety practices (p- value = $.003 < 0.05$), Fourthly, Health facility safety programs (p- value = $.022 < 0.05$) and the last workers participation in safety program (p- value = $.042 < 0.05$).
 - ii. The health facility waste management practices on the multi-nominal regression analysis of influencing variables showed that there were four variables with an observed statistical relationship as follows: the hospital policy compliance responsibility commitment (p- value = $.001 < 0.05$) and Human related factors (p- value = $.045 < 0.05$), Institution problems (p- value = $0.03 < 0.05$) and the health facility strategies for elimination of hazards significant (p- value = $.009 < 0.05$).
 - iii. The main variables that influence the proportions of occupational health hazards cases among the health care workers in the health facility through multi-nominal regression analysis showed that there were about three main influencing variables in this study that showed an observed

statistical relationship, they include: The respondents' professional categories (medical group) with (p- value = 0.016 < 0.05), Poor safety measures with (p- value = 0.022 < 0.05) and Poor hospital hazards Elimination and control measures with (p- value = 0.002 < 0.05).

iv. While the main variables that influence the proportions of occupational hazards health outcomes cases among the health care workers in the health facility through multi-nominal regression analysis showed that there were about three main influencing variables in this study that showed an observed statistical relationship, they include hospital safety compliance responsibility (p –value 0.004>0.05), pre and post exposure safety practices (p –value 0.015>0.05) and workers participation in hospital safety program (p –value 0.043>0.05),

Conclusion for the dependent variable

Based on the study findings as stated above, it is obvious that both the employers and the employees in the health facilities are strongly implicated with poor compliance to health and safety regulations. The findings supports the policy gap review that showed that the ILO and WHO safety and hazards control in workplace were not strictly adhered to based practices and incident investigations, report and follow up evidence. Unfortunately, there is absence of evidence based practices and report Training gap / information sharing and training evaluation records were not seen. Even focus group discussion findings showed that they received directions and waste handling during the morning staff meeting. Also new staffs are engaged in activities without prior training but he / she is given briefing on the job. There are some occupational hazards incidents cases that are not reported because they know that there is no feedback rather they gave only leave.

With regards to waste management practices study findings revealed a strong pitfall on the employers, this is equally in line with the hospital inspection report that showed; The waste management companies have no real program and develop rules on recovery and disposal of the waste. The hospital incinerators in

three health facilities in the study are not functioning, so the contaminated wastes are transported to another site for disposal increasing chances of cross infection. The process of waste collection, sorting, marking, storage and transportation are not in line with policy regulation, hence no real structured way.

The study findings on the determinants of the occupational health hazards cases in the health facility actually showed that major fault was from employers apart from post exposure safety compliance that was traced to the employees. Findings from focus group discussion on occupational health hazards related issues revealed issues related to work overtime, night shift and absence of leave, (work 200 hours per month, and even 210 hours per month.). In most cases due to shortage of staff. Also there are some incident cases of trauma which are not really given good attention and follow up by the administrators. So in this regards the government and hospital administrators have vital role to play as a way forward.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

This is a cross sectional study conducted at the three district health facilities in Kigali Rwanda among 237 health workers to determine the occupational health hazards cases and health outcomes suffered, the Human and Institutions factors influencing these hazards, hospital waste management practices and the compliance practices to safety measures in health facilities in Kigali. The compliance to safety practices was assessed through review of the operating work place occupational safety policy to identify the strength and weakness and put forward recommendation. In like manner hospital inspection was carried out to determine the workplace environment for safety mitigation strategies and waste management practices. Information was obtained from hospital management top ranked staff to help boost information gap from questionnaire and the focus group discussion. The study findings are discussed below:

Study findings showed that gender ratio of the study participants; according to male to female was 100:137. The predominant age category of the study participants were those in the age cohort of 30–39. Majority of the study participants 103 (43.5%, 95% CI=37.06 – 50.03) possessed diploma certificates, while about 103 (43.5%. 95% CI=37.06 – 50.03) had worked for 3-6 years

A high number of study participant, 99 (41.8%) have high level of awareness on occupational health and safety. This findings is in line with McGrowder D. Etal (2010) study on Knowledge, Awareness and Compliance with Universal Precautions among Health Care Workers at the University Hospital of the West Indies, Jamaica More respondents (92.9%) who were employed in the health sector for 16 years and over reported high levels of awareness of universal precautions than those who were employed for less than five years ($p < 0.0001$).

5.1.1 Proportion of occupational hazards cases and health outcomes among the health care workers in health facilities in Kigali Rwanda

Findings on the prevalence of occupational health hazards cases showed that working accident with the highest proportion frequency of 204 (86.1%, 95% CI=81.01 - 90.22). Also findings on the prevalence of occupational hazards health outcomes cases showed that back ache 142 (60%, 95% CI= 53.37 - 66.21) was the most prevalent of the occupational hazards health outcomes in the study, this is similar to another study on occupational hazards among clinical dental staff, with findings that showed backache as most frequently experienced hazard in 47% of the subjects (Fasunloro & Owotade, 2004). In like manner the study conducted by De Castro. A. B et al (2009) study on Occupational Health and Safety Issues among Nurses in the Philippines, findings from reporting behaviour, and safety concerns showed that approximately 40% of nurses had experienced at least one injury or illness in the past year, and 80% had experienced back pain. Most who had an injury did not report it. The top ranking concerns were stress and overwork.

Another important finding was on occupational health hazards related to Injury with blood borne pathogens 78 (32.9%, 95% CI=26.97 - 39.29), this is in line with study on perception and prevalence of work-related health hazards among health care workers in public health facilities in southern India. The study showed result that among the 81.5% who reported exposure to biological hazard, 93.9% had direct skin contact with infectious materials. Among HCWs reporting needle stick injury, 70.5% had at least one in the previous three months (Arasi et al 2015). In another study by Lee, on occupational transmission of blood borne diseases to healthcare workers in developing countries: they observed that majority of occupational acquired blood borne diseases by HCWs were as a result of needle stick injuries (Lee 2009)

Further occupational health hazards cases revealed in the study were slips and falls 82 (32.9%, 95% CI=28.56 - 41.03), Other studies with similar findings showing high incidence of musculoskeletal hazards among health care workers included study by (Texel 2005, Adegoke, Akodu & Oyeyemi 2008, Muralidhar, et al., 2010). This also equally corresponds to study by Arasi whose findings showed that ergonomic

hazards included lifting heavy objects (42%) and standing for long hours (37%). Psychological hazards included negative feelings (20.3%) and verbal or physical abuse during work (20.5%), (Arasi et al., 2015).

Another occupational hazard health outcome that occurred with significant proportion among study participants was stress related to over work and over time, (stressful work experience) 38 (16%, 95% CI= 11.60 - 21.34). This is just like study conducted in China on relationship between burnout and occupational stress among nurses that discovered occupational stress among HCWs has been argued to be responsible for high level of job burnout (Wu et al., 2007).

A multi-nominal regression analysis of variables that influence the health hazards cases in the health facility showed that there was an observed statistical relationship with three variables was identified as influencing variables to hazards cases through multinomial regression analysis; The respondents' professional categories (medical group) with (p- value = 0.016 < 0.05), Poor safety measures with (p- value = 0.022 < 0.05) and Poor hospital hazards Elimination and control measures with (p- value = 0.002 < 0.05). Findings from study by Nsubuga, and Jaakkola (2005) Needle stick injuries among nurses in sub-Saharan Africa showed that 57% of the nurses and midwives had experienced at least one needle stick injury in the last year. Only 18% had not experienced any such injury in their entire career. The rate of needle stick injuries was 4.2 per person-year. Multiple logistic regression analysis showed that the most important risk factor for needle stick injuries was lack of training on such injuries (OR 5.72, 95% CI 3.41-9.62). Manyele V et al. (2008) on current status of occupational health and safety (OHS) in Tanzanian hospitals and identify key areas for intervention Most of the supervisors were holders of certificates (54.4%). Only 42.9% (6/14) of the hospitals had at least a supervisor with post-graduate degree. Needle stick injuries accounted for the largest part of the most common accidents (52.9%); followed by splash of blood from patients (21.7%); burn injury from chemicals (10.6%); and slippery floors (5.9%).

5.1.2 Types of occupational hazards and health outcomes that the health care workers in the study were exposed to as identified by the study participants in the health facilities in Kigali;

The most common health hazards cases which the health care workers are exposed to that are similar to other study findings includes: Working accidents 204 (86.1%, 95% C.I.= 81.01 - 90.22), Chemicals splash 70 (29.5%, 95% C.I.= 23.81 - 35.79), assault and abuse 63 (26.6%, 95% C.I.= 21.07 - 32.69). Study conducted by Hryhorczuk *et al.*, 2004) in Tanzania the main occupational hazards to which health workers are exposed may be classified as infection, accident, radiation, exposure to noxious chemicals, drug addiction and psychological problems, and assault. Also the study findings by Shashi which revealed that potential biological hazards are infections through exposure to aerosols, spills and splashes during various activities, fungal infection due to wet clothes and environment and infections through hospital fomites, which is health facility associated factors (Shashi, Ramakrishna, and Bobby 2014).

The occupational hazards health outcome cases which the health care workers are exposed to that are similar to other study findings includes Cuts and tissue damage 189 (79.7%, 95% C.I.= 74.06 - 84.67), and Injuries, cuts and fracture 139 (58.6%, 95% C.I.= 52.09 - 64.99), Also findings from study by Nsubuga, and Jaakkola (2005) Needle stick injuries among nurses in sub-Saharan Africa showed that 57% of the nurses and midwives had experienced at least one needle stick injury in the last year. Only 18% had not experienced any such injury in their entire career. The rate of needle stick injuries was 4.2 per person-year. Multiple logistic regression analysis showed that the most important risk factor for needle stick injuries was lack of training on such injuries (OR 5.72, 95% CI 3.41-9.62).

5.1.3 The Human level factors influencing occupational hazards and health outcome cases among the health care workers in the health facilities in Kigali;

The results on the human level associated factors with occupational hazards and health outcomes on multinomial regression analysis at the level of 0.05 level of significant, showed that the following variables have strong positive association: institutional associated factors with (p- value = 0.00 < 0.05), Safety measures

opinion among health care workers with (p- value = $0.00 < 0.05$), Practices of post exposure safety compliance with (p- value = $0.047 < 0.05$) and Masaka health facility with (p- value = $0.005 < 0.05$). This finding varies with the findings of the study by Annalee Y. et al, (2007) on determinants of Healthcare Workers' Compliance with Infection Control Procedures A strong correlation was found between both environmental and organizational factors and self-reported compliance

5.1.4 Institutions level factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali.

The results on institutions level associated factors with occupational hazards and health outcomes assessed on multinomial regression analysis showed four variables to be positively statistically associated with the institutions factors as follows: Hospital safety policy compliance (p- value = $0.05 < 0.05$), Safety practices with (p- value = $0.01 < 0.05$), Workers participation in safety programs (p- value = $0.005 < 0.05$) and Human level factors (p- value = $0.000 < 0.05$).

5.1.5 Medical waste management practices in the health facilities in Kigali, Rwanda

Furthermore, the study findings in relation to medical waste management practices in the health facilities showed that about 119 (50.2%, 95% C.I=43.67 - 56.75) study participants response showed that hospital management do not provides adequate personal protective clothing and equipment for practices. The findings are similar with another study that established gap in hazard prevention strategies with regards to provision of personal protective equipment (PPE) to health care worker (Matanock, Arwady, Ayscue, Forrester, Gaddis et al., 2014). On further multinomial regression analysis of variables that is associated with positive statistical association to medical waste management practices at 0.05 level significant includes: hospital policy compliance responsibility commitment (p- value = $.001 < 0.05$) and Human related factors (p- value = $.045 < 0.05$), Institution problems (p- value = $0.03 < 0.05$) and the health facility strategies for elimination of hazards significant (p- value = $.009 < 0.05$). The findings are similar to study by Ndejjo et al. (2015) study in Kampala study about 50.0% of respondents reported experiencing an occupational

health hazard, 39.5% experienced biological hazards while 31.5% experienced non-biological hazards. Predictors for experiencing hazards included not wearing the necessary personal protective equipment (PPE), working overtime, job related pressures, and working in multiple health facilities. Both study found human associated factors and institutions associated factors as a predictor factors to occupational health hazards associated with waste management.

The hospital waste management program on inspection showed no evidence of health waste management reduction facility plan and updated document (in case of changes in production technology every five years). The waste management companies have no real program for develop rules on recovery and disposal of the waste. The hospital waste collected were stored in plastic bin without proper colour mark, same colour are used each week, collection, transportation and disposal are not regular and not in line with policy guide line.

The hospital incinerators in the three health facilities in the study area are not functioning, so the contaminated wastes are transported to another site for disposal (increasing chances of cross infection. There were some provision made in some health facilities for managing and handling liquid wastes, blood and blood products, placenta and other human wastes. The process of waste collection, sorting, marking, storage and transportation are not in line with policy regulation, hence no real structured way. The chemical wastes were disposed in the drainage and no proper form of disposal. The Potters and cleaners were seen wearing protective apron, boots, gloves and mask while on duty, especially while emptying the bin at the end of the shift per day.

The policy and procedures for medical waste management decontamination are not available in the storage area, though the storage area are kept clean, but still there are rodents around and the location is not near the patients kitchen. There was no form of training aid posted as guide for the hospital waste management staff and no first aid facility to handle emergencies. No file record of update of storage area personnel training and hazard prevention strategies or injury and emergency response procedure

5.1.6 Compliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals

The Compliance to workplace Occupational Health and Safety policy formed an important prerequisite for productivity due to broad scope of the concept. The study found that high number of study participants are practicing hand washing after any direct contact with Patient and safe collection and disposal of sharps equipment's. Another high frequencies of the participants confirmed use of gloves for contact with body fluids, non-intact skin and mucous and correct disposal of used personal protective equipment safely. In the area of compliance to universal post exposure precautions, with regards to careful handling and disposing of sharp instruments during and after procedures. Another high percentage of workers, 211 (84.7%, 95% C.I= 79.66 – 88.97) gave approval of practice of immediate washing of hands and other skin surfaces after contact with blood. On the other hand, about 117 (47%, 95% C.I= 40.66 – 53.39) respondents' responses showed noncompliance to the re-evaluation of exposed health care workers within 72 hours. Study by Baets De. Et al (2007) on the Access to occupational post-exposure prophylaxis for primary health care workers in rural Africa: Respondents who received in-service PEP training had significantly higher mean knowledge and confidence scores but no different mean attitude scores than those who did not. The mean total score for those who received the adapted PEP training (10.7 of 12) was significantly higher ($P = .008$) than for those who did not (8.8 of 12).

The study findings on Hospital Occupational health and safety committee Policy compliance and employee participation result showed an average level of compliance and slightly above average responses that confirms the existence of written statements, goals, contracts languages other document describing functions, duties and authorities of health and safety committee. While below average of the study participants agrees that there are formal procedures for employees to report health and safety hazards, problems, issues or concerns. However, about 144 (50.8%, 95% C.I= 54.23 - 67.02) responses showed that the hospital does not offer any health and safety incentive programs and about 129 (54.4%, 95% C.I=47.85 - 60.89) disagreed that the hospital safety committee does not meet consistently at a regular schedule

time and place. Also, about 131 (55.3%, 95% C.I.= 48.70 - 61.71) responses disagreed that there are no investigations/analyses performed for all accidents resulting in injury, regardless of how minor they may be and reported

The most significant determinant variables in the study that influences the workers Compliance to safety regulations included the health facility Hazards cases reporting system with (p- value = 0.001<0.05) and Practice of post exposure safety compliance (p- value = 0.000<0.05) level of significant. Also positive association exist with Occupational health and safety practices (p- value = 0.000<0.05) level of significant. Found statistically significant is the Health facility waste practices (p- value = 0.000<0.05) and Health institution associated factors (p- value = 0.01<0.05). This finding is in line with Mailu. (2016) study was to establish employees' perception on occupational health and safety at Eapcc, further determine the extent to which workers had complied with the OSHA 2007 stipulations. The regression results show that there was significant relationship between occupation health concerns and employees performance ($r = - 0.925$, $p=0.001$) and a negative but significant relationship between occupational safety concerns and performance of employees ($r= - 0.777$, $P=0.002$). Another study in Nairobi; by Nzuve & Ayubu.(2012), on the Extent of Compliance with Occupational Safety and Health Regulations at Registered Workplaces in Nairobi. The Overall, the extent of compliance with the Act at workplace stood at 64.49%. Organizations still have an abysmal 35.5% level of non-compliance that should be addressed to minimize the dire consequences of non-compliance.

Findings from the Occupational Health and safety Policy Gap Analysis showed: The Government of Rwanda adopted the health facility accreditation system as one of the many strategies to improve quality of care, to foster continuous quality in Health facilities and with elaborated policies, procedures and guidelines to be followed in service delivery. There were evidence of poor compliance to incident investigations, report and follow up. Training gap/ information sharing and training evaluation records were not seen. Workplace environmental safety are not fully enforced (Poor equipment maintenance, engineering, poor supply of PPE) these are necessary to prevent hazards. There were absence of safety guidelines for activities in various

departments and job supervision and evaluation update or incident report. The forum for dealing with challenges in waste management does not exist and great burden of manual handling and lifting Safety committee and responsibilities though recently inaugurated, but without real safety activities. No regular meeting, No record of meetings, No investigation on safety related issues, No record of cases.

The top hospital management cadre showing their level commitment that ensured a safe workplace for the employees tries to identifies the chairperson of Safety and members that manages safety and hazards related issues, through design and implementation of the applicable safety national safety policy program. The responses from the top management staff of the three health facilities in the study showed that 6 (66.7%, 95% C.I.=29.93 – 92.51) agreed that the top hospital management implements a written policy supporting and mandating the safety and health management system same proportion showed that Top hospital management assigns responsibility and accountability for the implementation and maintenance of the program. Also about 6 (66.7%, 95% C.I.=29.93 – 92.51) responses showed that Hospital management effectively communicates its worker health and safety goals and expectations to all those working for or on behalf of the organization. On the other hand only 3 out of the 9 hospital management (33.3%, 95% C.I= 07.49 – 70.07) responses showed that everyone in the hospital knows who has been assigned responsibility for the program and Hospital management recognizes employee contributions to worker safety and health at the hospital. Also Hospital management routinely demonstrates visible commitment to the program.

The ILO and WHO safety and hazards control in workplace were not strictly adhered to based practices and incident investigations, report and follow up evidence, Unfortunately, there are absence of evidence based practices and report. Training gap / information sharing and training evaluation records were not seen. Workplace environmental safety are not fully enforced (Poor equipment maintenance, engineering, poor supply of PPE) these are necessary to prevent hazards. Though there are some safety guidelines for activities in some departments, but there communications are not fully empowered when you consider the responses of some

health care workers Absence of job supervision and evaluation update or incident report.

The forum for dealing with challenges in waste management does not exist and great burden of manual handling and lifting, even storage and disposal mechanism are not in line with the policy guide especially for hazardous chemicals. Safety committee and responsibilities though recently inaugurated, but without real safety activities. No regular meeting, No record of meetings, absence of investigation on safety related issues, No record of cases, There are no documented statistics of the hazards cases and health outcomes among workers and it is similar with the other sectors in Rwanda. This is a call for concern and need to be strengthened by the national council of occupational health and safety in Rwanda.

Finally, multi-nominal regression analysis on the variables that influences Compliance to Safety regulations in the study showed that there was an observed statistical association with Actions that Influence poor policy (p- value = .004 < 0.05), Health facility waste practices (p- value = .002 < 0.05), Hospital management safety practices (p- value = .003 < 0.05), Health facility safety programs (p- value = .022 < 0.05) and workers participation in safety program (p- value = .042 < 0.05).

Focus group discussion findings brought out other determinant issues related to work overtime (work 200 hours per month, and even 210 hours per month.), night shift and absence of leave due to shortage of staff. Another issue was poor investigation, follow up and report of workplace incident cases. Sometimes, cleaners are compelled to engage in wastes collection and to pack them in sacs, in that time the wastes release the repellent gases, because the hospital have no incinerator. Also work demand and pressure of work seems to provoke increases risk of occupational hazards and at times due to shortage of staff, when one person does a work to be handled by many others. Others determinants include poor incentives and motivation, poor supply of personal protection equipment and absence of routine test for hepatitis and related diseases.

Institution Compliance health and safety; showed low level of compliance to training, work supervision, provision of safety information and practices guides and

staff involvement in safety programs. There are no guidelines on risk aversions and procurement procedures for equipment replacement related to hygiene / waste management. This is not in line with the national policy provision in Rwanda. In some cases new staffs are recruited to fill the gap created by staff that left without prior notice, these new staff are deployed without prior training..This particular practices is not in compliance with the policy prescription for the health facilities. Future Action Plan: follow up on the hospital waste management companies to ensure they provide quality services unlike the current poor services and to assign a staff to oversee their activities since they already knows about health facilities and their types of wastes. The need to improve on workplace hazards accidents and incident report. The treatment and follow up and compensation for risk exposure and other staff victims

Key lesson from the study

There are many short falls with compliances to workplace safety for both the employers and the employees which affect their health negatively and the quality of care.

Occupational health and safety study like this would most likely provide moral, legal and economic benefits to the society, when proper lesson are drawn.

Adherence to set standards and guidelines in workplace not only promotes safety but prevents disability, economic loss, meet job demand and with quality assurance.

This study revealed major underlying employee and employers' factors like non motivation of workers, negligence, incident reporting / documentation gap, weak regulations and safety enforcement system.

It equally throws light on the prevalence of health hazards occurrence among different categories of health workers and short falls on hazard prevention and safety practices which provide data that are useful for various purposes

Key issues and /or reforms that could help strengthen worker safety lies on hospital management policy commitment and ensuring employee participation in safety program

5.2 Conclusion

1. Proportion of occupational hazards cases and health outcomes among the health care workers in health facilities in Kigali Rwanda

The occupational hazards cases with highest prevalence in the study was working accident and Slips and falls and blood borne diseases respectively and the occupational hazards health outcome with highest prevalence in the study was back ache and Lung diseases.

2. Types of occupational hazards and health outcomes that the health care workers in the study were exposed to as identified by the study participants in the health facilities in Kigali;

The most common health hazards cases which the health care workers are exposed to includes: Working accidents, chemical splash assault and accidents while the occupational hazards health outcome cases that the health care workers are exposed includes Cuts and tissue damage and Injuries, cuts and fracture.

3. The Human level factors influencing occupational hazards and health outcome cases among the health care workers in the health facilities in Kigali;

The Human factors in the determinant of occupational hazards and health outcomes are ssafety measures opinion among health care workers, Practices of post exposure safety compliance and some specific health facility factors (Masaka).

4. Institutions level factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali.

Furthermore, the institution associated factors in the determinant of occupational hazards and health outcomes are the OSH Policy compliance, Safety practices, Workers participation in safety programs and Human associated factors.

5. Medical waste management practices in the health facilities in Kigali, Rwanda

The Medical waste management practices were: influenced by poor hospital policy Compliance responsibility commitment, Human related factors, the Institution associated problems and the health facility strategies for elimination of hazards. Also there are no evidence of medical waste management reduction facility plan and updated document or real program for developed rules on recovery and disposal of the waste. No file record of update of storage area personnel training and hazard prevention strategies or injury and emergency response procedure.

6. Compliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals

This study observed low compliance level with occupational health and safety policy in relation to employee participation in safety program, post exposure safety compliance, hospital management leadership commitment, Strategies for Hazards prevention in hospital, Health Facility Safety Programs and hazards reports systems

The top hospital management cadre admits they implements a written policy supporting and mandating the safety and health management system and assigns responsibility and accountability for the implementation and maintenance of the program. Also effectively communicates its workers on health and safety goals and expectations to all those working for or on behalf of the organization.

5.3 Recommendations

1. Proportion of occupational hazards cases and health outcomes among the health care workers in health facilities in Kigali Rwanda

The need for risk reduction and aversion through hazards mitigation strategies, proper job placement and safety education

2. Types of occupational hazards and health outcomes that the health care workers in the study were exposed to as identified by the study participants in the health facilities in Kigali;

The health facilities administrators should strive to improve on the safety communication, safety guidelines, job supervision and risk aversion and hazards reporting and investigations.

3. The Human level factors influencing occupational hazards and health outcome cases among the health care workers in the health facilities in Kigali;

To ensure regular workers training on safety, improved communication on safety information especially during induction of new workers and strict enforcement of the safety compliances in field of practices.

4. Institutions level factors influencing occupational hazards and health outcomes among health care workers in the health facilities in Kigali.

The health facilities administrators should engage in Human capacity development through safety education, accident investigations and documentation, promotion of safety practices and involvement of workers in safety programs.

5. Medical waste management practices in the health facilities in Kigali, Rwanda.

To ensure regular training of staff in waste management department on safety, enforce strict adherence to medical waste management practices in waste reduction, storage, decontamination, recycling, and disposal. To ensure that safety protective equipments' are provided.

7. Compliances to safety standards adopted for the protection of health workers based on policy guidelines in hospitals

There is need to strengthen policy enforcement system for the employers, to increase workers participation in safety programs and strengthen pre and post exposure compliance to safety. The health facilities incinerators must be made functional and regular hazards incident investigations, follow up and improved surveillance very important..

5.4 Suggestion for further studies

There are needs for harmonization and international comparability of well-designed study and properly identify the multiple factors in the aetiology of occupational hazards with closer attention to risks aggravated by job insecurity and poor training of workers in the workplace.

May be an interdisciplinary approach might help to throw more light in identification of key issues and /or reforms that could help strengthen worker safety. More research would help to identify the economic and non- economic relationships to occupational hazards.

Also study on the effect of the hazards on job performance and consequences of the hazards and worsening effect on human resources shortage. Others could carry out study on the assessment of the effectiveness of safety training as measures countering occupational health hazards in workplace.

An investigation to assess the consequences of hazards exposure and illness outcome may be helpful. Lastly, study on the barriers to effective communication of safety standard and practices in workplace.

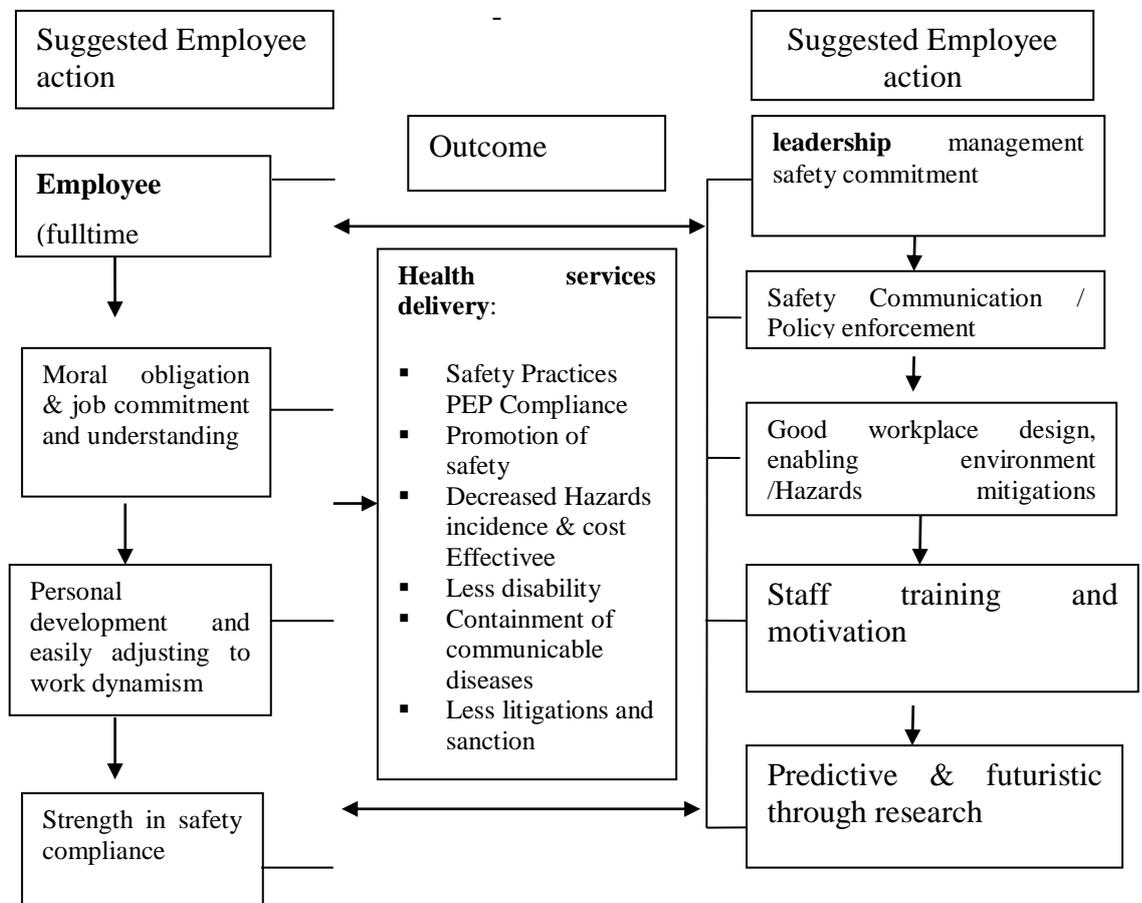
5.5 Contribution of the current study to learning

- This study revealed major underlying employee and employers' factors like poor involvement of workers in safety programs and non motivation of

workers, negligence, incident reporting / documentation gap, weak regulations and safety enforcement system.

- It equally throws light on the prevalence of occupational hazards and health outcomes among the health care workers and the factors that influenced it, these could be used for policy reforms or could provide data that are useful for various purposes and for risk reduction in work place.
- Key issues and / or reforms that could help strengthen worker safety lies on hospital management policy commitment and ensuring employee participation in safety program and improved hazards mitigations.

Model for dealing with Occupational Health Hazards in health facility



REFERENCES

- Adamu G. U. & Aisha, A (2017). Common occupational health hazards amongst Health care workers in a Tertiary Health Institution in Bida, North-central Nigeria. *International Journal of Biomedical Research* 8(01), 01-06.
- Adema, W., & Ladaique, M. (2009). How Expensive is the Welfare State?.
- Ahmad, K. Monjed, M. (2004). *Investigation of Occupational Health and Safety Hazards among Domestic Waste Collectors in Bethlehem and Hebron Districts*. ANajah National University, Nablus, Palestine.
- Akehurst, G., Simarro, E., & Mas-Tur, A. (2012). Women entrepreneurship in small service firms: Motivations, barriers and performance. *The Service Industries Journal*, 32(15), 2489-2505.
- Al Hassani. M.S. (2010). *Development of a System Based Approach for Strategic Implementation of Occupational Health and Safety Practices in Health Care Organizations*. (a PhD thesis), Bradford University.
- Alamgir, H., Cvitkovich, Y., Yu, S. & Yassi, A. (2007). Work-related injury among direct care occupations in British Columbia, Canada, *Occupational and Environmental Medicine*, 64, 769-775.
- Ali, S. M., & Lindström, M. (2008). Psychosocial work conditions, unemployment and health locus of control: A population-based study. *Scandinavian journal of public health*, 36(4), 429-435.
- Allen, S. G. (1981). An Empirical Model of Work. Attendance. *The Review of Economics and Statistics*, 63(1), 77-87.
- Alli, B. O. (2008). Fundamental Principles of Occupational Health and Safety: 2nd ILO Geneva .and Health. *International Journal of Occupational Safety and Ergonomics* 12(3), 255–266.

- Amira, C.O., & Awobusuyi, J.O. (2014). Needle-stick injury among health care workers in haemodialysis units in Nigeria: a multi-center study. *Int J Occup Environ Med.*; 5(1), 1-8.
- Andersen, L. L., Clausen, T., Mortensen, O. S., Burr, H., & Holtermann, A. (2012). A prospective cohort study on musculoskeletal risk factors for long-term sickness absence among healthcare workers in eldercare. *International archives of occupational and environmental health*, 85(6), 615-622.
- Annalee Y., Karen, L., Ray, C., Mickey, K., & Marc Corbiere, E. (2007). Determinants of Healthcare Workers' Compliance with Infection Control Procedures. *Healthcare Quarterly*. 10(1), 44-52.
- Arocena, P., & Núñez, I. (2009). The effect of occupational safety legislation in preventing accidents at work: traditional versus advanced manufacturing industries. *Environment and Planning C: Government and Policy*, 27(1), 159-174.
- Arocena, P., Nunez, I. & Villanueva, M. (2008). The Impact of Prevention Measures and Organisational Factors on Occupational Injuries, *Safety Science*, 46(9), 1369-1384.
- Arocena, P., Núñez, I., & Villanueva, M. (2008). The impact of prevention measures and organisational factors on occupational injuries. *Safety Science*, 46(9), 1369-1384.
- Articles 156-160 of the Law regulating Labour in Rwanda, 2009 (aka Labour Code), USDOS Human Rights Report 2013, Articles 3-6 Ministerial Order N°07 of 13/07/2010 Determining the Modalities of Functioning of the Labour Inspector
- Askenazy, P. (2006). *Some determinants of reporting workplace accidents in France: The role of labour contract*. Paris:Centre Pour LaRechercheEconomique Et ses Applications; (CEPREMAP), Paper No 0606.

- Askenazy, P. (2006). Some determinants of reporting workplace accidents in France: The role of labour contract. *Centre Pour La Recherche Economique Et Ses Applications (CEPREMAP), Paper*, (0606).
- Barham, C., & Begum, N. (2005). Sickness absence from work in the UK. *Labour market trends*, 113(4), 149-158.
- Barmby, T. A., Ercolani, M. G., & Treble, J. G. (2002). Sickness absence: an international comparison. *The Economic Journal*, 112(480), F315-F331.
- Blanch, A., Torrelles, B., Aluja, A., & Salinas, J. A. (2009). Age and lost working days as a result of an occupational accident: A study in a shiftwork rotation system. *Safety Science*, 47(10), 1359-1363.
- Bockerman, P. & Laukkanen, E. (2010). What makes you work while you are sick? Evidence from a survey of workers, *The European Journal of Public Health*, 20(1), 43-46.
- Böckerman, P., & Ilmakunnas, P. (2008). Interaction of working conditions, job satisfaction, and sickness absences: evidence from a representative sample of employees. *Social science & medicine*, 67(4), 520-528.
- Böckerman, P., & Laukkanen, E. (2009). What makes you work while you are sick? Evidence from a survey of workers. *European Journal of Public Health*, 20(1), 43-46.
- Boone, J. & van, O. (2006). Are recessions good for workplace safety, *Journal of Health Economics*, 25 (6), 1069- 1093.
- Boone, J., & Van Ours, J. C. (2006). Are recessions good for workplace safety?. *Journal of Health economics*, 25(6), 1069-1093.
- Bradley, S., Green, C. & Leeves, G. (2007). *Employment Contracts and Effort: Why Do Temporary Workers Take Less Absence?* School working paper 2007/026. Lancaster University.

- Braka, F., Nanyunja, M., Makumbi, I., Mbabazi, W., Kasasa, S., & Lewis, R. F. (2006). Hepatitis B infection among health workers in Uganda: evidence of the need for health worker protection. *Vaccine*, 24(47-48), 6930-6937.
- Brakaa, F. et al (2006). Hepatitis B infection among health workers in Uganda: Evidence of the need for health worker protection. *Vaccine* 24, 6930-7.
- Brooker, A. S., Frank, J. W., & Tarasuk, V. S. (1997). Back pain claim rates and the business cycle. *Social science & medicine*, 45(3), 429-439.
- Brooker, A.S., Frank, J. W. & Tarasuk, V.S. (1995). Back pain claim rates and the business cycle: in contrast to acute claim rates, *Social Science and Medicine*, 45(3), 429-439.
- Brousse, G., Fontana, L., Ouchchane, L. (2008). Psychopathological features of a patient population of targets of workplace bullying, *Occupational Medicine*, 58(2), 122-128.
- Brousse, G., Fontana, L., Ouchchane, L., Boisson, C., Gerbaud, L., Bourguet, D., ... & Chamoux, A. (2008). Psychopathological features of a patient population of targets of workplace bullying. *Occupational medicine*, 58(2), 122-128.
- Burke, M. J., Sarpy, S. A., Smith-Crowe, K., Chan-Serafin, S., Salvador, R. O., & Islam, G. (2006). Relative effectiveness of worker safety and health training methods. *American journal of public health*, 96(2), 315-324.
- Burke, M.J., Sarpy, S.A., Smith-Crowe, K., Chan-Serafin, S., Salvador, R.O. & Islam G. (2006). Relative effectiveness of worker safety and health training methods. *American Journal of Public Health*, 96, 2.
- Cassito, M. G., Fattorini, E., Gilioli, R., & Rengo, C. (2003). *Raising awareness of psychological harassment at work: advice to health professionals, decision makers, managers, human resources directors, legal community, unions and workers*. Geneva: World Health Organization.

- Cassitto, M.G., Fattorini, E., Gilioli R., & Rengo, C. (2003). Raising awareness of Psychological Harassment at Work, *Protecting Worker's Health Series*, No. 4, Rome: World Health Organization.
- CDC (2012). *Best Practices for Infection Prevention and Control Programs in Ontario* | Ontario: Queen's Printer;.
- CDC (Centre for Disease Control and Prevention) (2007). Indicators for Occupational Health Surveillance, Morbidity and Mortality *Weekly Report (MMWR)*, 56(1), 1-8.
- Centers for Disease Control and Prevention (CDC). (2009). *Prevention of healthcare-associated infections*; Presented at the Council of State and Territorial Epidemiologists. Retrieved from <https://www.cdc.gov/hai/prevent/prevention.html>
- Chatterji, M. & Tilley, C.J. (2002). Sickness, absenteeism, presenteeism and sick pay, *Oxford Economic Papers*, 54(4), 669-87.
- Chatterji, M., & Tilley, C. J. (2002). Sickness, absenteeism, presenteeism, and sick pay. *Oxford Economic Papers*, 54(4), 669-687.
- Chatterji, M., & Tilley, C. J. (2002). Sickness, absenteeism, presenteeism, and sick pay. *Oxford Economic Papers*, 54(4), 669-687.
- Cole, E. A. (2009), *Personnel and human resource management* (5th ed.). London: Biddles Limited.
- Coles, M., Lanfranchi, J., Skalli, A., & Treble, J. (2007). Pay, technology, and the cost of worker absence. *Economic Inquiry*, 45(2), 268-285.
- Coles, M., Lanfranchi, J., Skalli, A., and Treble, J. (2007). Pay, technology and the cost of worker absence, *Economic Inquiry*, 45, 268–285.
- Curington, W. P. (1986). Safety regulation and workplace injuries. *Southern Economic Journal*, 53, 51-72.

- Dahlgren, A., Kecklund, G. & Åkerstedt, T. (2006). Overtime work and its effects on sleep, sleepiness, cortisol and blood pressure in an experimental field study, *Scandinavian Journal of Work, Environment and Health*, 32(4), 318- 327.
- Dahlgren, A., Kecklund, G. & Åkerstedt, T. (2005). Different levels of work-related stress and the effects on sleep, fatigue and cortisol, *Scandinavian Journal of Work, Environment and Health*, 31(4), 277-285
- Dahlgren, A., Kecklund, G., & Åkerstedt, T. (2005). Different levels of work-related stress and the effects on sleep, fatigue and cortisol. *Scandinavian journal of work, environment & health*, 277-285.
- Dahlgren, A., Kecklund, G., & Åkerstedt, T. (2006). Overtime work and its effects on sleep, sleepiness, cortisol and blood pressure in an experimental field study. *Scandinavian journal of work, environment & health*, 318-327.
- Damien, M., McElvenny, Ben G. A. Lars, J. & Julian, P. T. H (2004). Meta-analysis in occupational Epidemiology: a review of practice. *Occupational Medicine* 54, 336–344.
- De Castro, A. B., Cabrera, S. L., Gee, G. C., Fujishiro, K., & Tagalog, E. A. (2009). Occupational health and safety issues among nurses in the Philippines. *Aaohn Journal*, 57(4), 149-157.
- DeLeire, T., & Levy, H. (2004). Worker Sorting and the Risk of Death on the Job. *Journal of Labor Economics*, 22(4), 925-953.
- Dembe, A. E. (2001). The social consequences of occupational injuries and illnesses. *American journal of industrial medicine*, 40(4), 403-417.
- Dembe, A. E., Erickson, J. B., & Delbos, R. (2004). Predictors of work-related injuries and illnesses: national survey findings. *Journal of occupational and environmental hygiene*, 1(8), 542-550.

- Dembe, A. E., Erickson, J. B., Delbos, R. G., & Banks, S. M. (2005). The impact of overtime and long work hours on occupational injuries and illnesses: new evidence from the United States. *Occupational and environmental medicine*, 62(9), 588-597.
- Dembe, A.E., Erickson, J., & Delbos, R. (2004). Predictors of Work-Related Injuries and Illnesses: National Survey Findings”, *Journal of Occupational and Environmental Hygiene*, 1(8), 542–550.
- Denny, H. M. (2012).*Impact of Occupational Health Interventions in Indonesia*. University of South Florida. Graduate Theses and Dissertations <http://scholarcommons.usf.edu/etd/4308>
- Denscombe, M. (1993). Personal health and the social psychology of risk taking, *Health Education Research*, 8(4), 505- 517.
- Denscombe, M. (1993). Personal health and the social psychology of risk taking. *Health Education Research*, 8(4), 505-517.
- Dew, K., Keefe, V. & Small, K. (2005), choosing to work when sick: workplace presenteeism, *Social Science and Medicine*, 60, 2273-2282.
- Dew, K., Keefe, V., & Small, K. (2005). ‘Choosing’ to work when sick: workplace presenteeism. *Social science & medicine*, 60(10), 2273-2282.
- Dione, J. & Dostie, B. (2007). New Evidence on the Determinants of Absenteeism Using Linked Employer-Employee Data, *Industrial and Labor Relations Review*, 61(1), 108-120.
- Dionne, G., & Dostie, B. (2007). New evidence on the determinants of absenteeism using linked employer-employee data. *ILR Review*, 61(1), 108-120.
- Edema W, Ladaique, M. (2009). How expensive is the Welfare State? Gross and Net Indicators in the OECD Social Expenditure Database. *Social, Employment and Migration Working Papers*.92-97.

- Ercolani, M. (2006). *UK Employees' Sickness Absence: 1984-2005*. London: Department of Economics, University of Birmingham.
- European Commission (2004). *Labour market transitions and advancement: temporary employment and low-pay in Europe, Employment in Europe, Recent Trends and Prospects, Luxembourg, 4, 159-186*.
- European Commission. Directorate-General for Employment, & Equal Opportunities. Unit F4. (2009). *Causes and circumstances of accidents at work in the EU*. Dublin: Office for Official Publications of the European Communities.
- European Foundation for the Improvement of Living and Working Conditions. (2002). *Quality of work and employment in Europe: Issues and challenges*. Foundation paper, 1.
- European Foundation for the Improvement of Working and Living Conditions (EUROFOUND) (2002). *Quality of work and employment in Europe: Issues and challenges*, Dublin: Office for Official Publications of the European Communities.
- Eyayo, F. (2014), Evaluation of Occupational Health Hazards among Oil Industry Workers: A Case Study of Refinery Workers. *IOSR*; 12 (8), 2319-2399.
- Eyayo, F. (2014). Evaluation of occupational health hazards among oil industry workers: a case study of refinery workers. *IOSR J Environ Sci Toxicol Food Technol (IOSR-JESTFT)*, 8, 22-53.
- Faragher, E. B., Cass, M., & Cooper, C. L. (2013). The relationship between job satisfaction and health: a meta-analysis. In *From Stress to Wellbeing Volume 1* (pp. 254-271). London: Palgrave Macmillan,
- Faragher, E.B., Cass, M. & Cooper, C.L. (2005). The relationship between job satisfaction and health: A meta - analysis, *Occupational and Environment Medicine*, 62, 105-112.

- Fasunloro, A., & Owotade, F. J. (2004). Occupational hazards among clinical dental staff. *J Contemp Dent Pract*, 5(2), 134-152.
- Fenn, P. & Ashby, S. (2004). Workplace Risk, Establishment Size and Union Density, *British Journal of Industrial Relations*, 43(3), 461-480.
- Finn, P. (1981). The effects of shift work on the lives of employees. *Monthly Lab. Rev.*, 104, 31.
- Finn, P., (1981). The effects of shift work on the lives of employees. *Monthly Labor Review*, 104, 31–35.
- Fischer, J. A., & Sousa-Poza, A. (2009). Does job satisfaction improve the health of workers? New evidence using panel data and objective measures of health. *Health economics*, 18(1), 71-89.
- Fischer, J.A.V. & Sousa-Poza, A. (2009). Does Job Satisfaction Improve the Health of Workers? New Evidence using Panel Data and Objective Measures of Health, *Health Economics*, 18, 71–89.
- Foppa, I., & Noack, R. H. (1996). The relation of self-reported back pain to psychosocial, behavioral, and health-related factors in a working population in Switzerland. *Social science & medicine*, 43(7), 1119-1126.
- Furnham, A. (1988). *Lay theories: Everyday understanding of problems in the social sciences*. Pergamon Press.
- Garcia-Serrano, C., Hernanz, V. & Toharia, L. (2008). Mind the gap, please! The effect of temporary help agencies on the consequences of work accidents, *Institute for Social and Economic Research*, No. 2008-28.
- Gauchard, G. C. ,et al. (2006), Determinants of accident proneness: a case–control study in railway workers, *Occupational Medicine*, 56, 187–190.

- Gauchard, G. C., Mur, J. M., Touron, C., Benamghar, L., Dehaene, D., Perrin, P., & Chau, N. (2006). Determinants of accident proneness: a case-control study in railway workers. *Occupational medicine*, 56(3), 187-190.
- Ghosh, A. K., Bhattacharjee, A., & Chau, N. (2004). Relationships of working conditions and individual characteristics to occupational injuries: a case-control study in coal miners. *Journal of occupational health*, 46(6), 470-480.
- Gibbons, D. E., & Newton, J. T. (1998). *Stress solutions for the overstretched*. London: British Dental Association.
- Grazier, S., & Sloane, P. J. (2008). Accident risk, gender, family status and occupational choice in the UK. *Labour Economics*, 15(5), 938-957.
- Green, F., & Tsitsianis, N. (2005). An investigation of national trends in job satisfaction in Britain and Germany. *British Journal of Industrial Relations*, 43(3), 401-429.
- Gyekye, A. S., & Salminen, S. (2006). Making sense of industrial accidents: The role of job satisfaction. *Journal of Social Sciences*, 2(4), 127-134.
- Hassink, W. & Koning, P. (2009). Do Financial Bonuses to Employees Reduce their Absenteeism: Outcome of a Lottery, *Industrial and Labor Relations Review*, 62(3), 4.
- Henrekson, M., and M. Persson, (2004). The Effects on Sick Leave of Changes in the Sickness Insurance System. *Journal of Labor Economics*, 22 (4), 87-114.
- Hernanz, V., & Toharia, L. (2006). Do temporary contracts increase work accidents? A microeconomic comparison between Italy and Spain. *Labour*, 20(3), 475-504.
- Heywood, J.S., Jirjahn, U. & Wei, X. (2008). Team work, monitoring and absence, *Journal of Economic Behavior and Organization*, 68, 676-690.

- Hintermann, B., Alberini, A., & Markandya, A. (2010). Estimating the value of safety with labour market data: Are the results trustworthy?. *Applied Economics*, 42(9), 1085-1100.
- Houtman, I., Karin J., & Leonor, C. (2007). *Raising awareness of stress at work in developing countries: A modern hazard in a traditional working environment: Advice to employers and worker representatives*. Protecting Workers' Health; Series no. 6. Geneva, Switzerland: World Health Organization.
- HSE (Health and Safety Executive) (2004), *Review of the occupational health and safety of Britain's ethnic minorities*, Research Report 221, Suffolk: HSE Books.
- HSE (Health and Safety Executive) (2006), *Health and Safety Management and Business Economic Performance: An Econometric Study*, Research Report 510, Suffolk: HSE Books.
- HSE (Health and Safety Executive) (2008). *An empirical analysis of the effect of health on aggregate income and individual labour market outcomes in the UK*, Research Report 639, Suffolk: HSE Books. Retrieved from <http://www.healthknowledge.org.uk/public-health-textbook/disease-causation-diagnostic/2f-environment/health-safety-work>
- ILO (2003). *Safety Culture at Work. Safety in numbers - Pointers for a global safety culture at work*, Geneva: International Labour Office.
- ILO (2005). *Introductory report: Decent work -safe work*, Geneva: International Labour Office.
- ILO (2006). *Occupation safety and health country profiles*, Geneva: International Labour Office.
- ILO (2008). *Beyond death and injuries: The ILO's role in promoting safe and healthy jobs*, Geneva: International Labour Organization.

- ILO. (2011). ILO Introductory Report: Global Trends and Challenges on Occupational Safety and Health. Geneva: International Labour Office.
- ISG, (2011), Occupational Health and Safety Magazine, Available at (www.oicvet.org/oshnet/files/juornal1-isgumpdf) retrieved on 27th August 2014.
- Jagger, J., et al., (2003). *Occupational exposure to blood borne pathogens: epidemiology and prevention*. In Wenzel RP, (Ed.). *Prevention and Control of Nosocomial Infections*. (4th ed.). Baltimore, MD: Lippincott, Williams and Wilkins.
- Jawaid M, Iqbal, M. Shahbaz, S. (2009). Compliance with standard precautions: a long way ahead. *Journal of Public Health*; 38:85-8.
- Joan B. (2010). *WHO Healthy workplace framework and model: Background supporting literature and practices*. WHO Headquarters, Geneva Switzerland.
- Joensuu, M. & Lindstrom, K. (2003). *Sickness absence and stress factors at work*, Helsinki: Finnish Institute of Occupational Health.
- Johansson, J. A. (1995). Psychosocial work factors, physical work load and associated musculoskeletal symptoms among home care workers. *Scandinavian Journal of Psychology*, 36 (2)113–129.
- Johansson, P. & Palme, M. (2001). Estimating Compensating Wage Differentia Is from Worker Mobility, Stockholm School of Economics, *Working Paper Series in Economics and Finance, Working Paper No 0453*.
- Kahneman, D. (2002), *Heuristics and Biases: The Psychology of Intuitive Judgment*, Cambridge: Cambridge University Press.

- Karnon, J., Tsuchiya, A. & Dolan P. (2005). Developing a relativities approach to valuing the prevention of non-fatal work-related accidents and ill-health, *Health Economics*, 14(11), 1103–1115.
- Kaukiainen, A., Akila, R., Martikainen, R. and Sainio, M. (2008). Symptom screening in detection of occupational solvent-related encephalopathy, *International Archives of Occupational and Environmental Health*, 82(3): 343-355.
- Konstantinos, P. & Iohannis, T. (2010). An Inquiry into the Theory, Causes and Consequences of Monitoring Indicators of Health and Safety at Work. *Institute for the Study of Labor*. IZA DP No. 4734.
- Kramers, P.G.N. (2003). The ECHI project: Health Indicators for the European Community, *European Journal of Public Health*, 13(3), 101-106.
- Krause, N., Frank, J. W., Dasinger, L. K., Sullivan, T. J., & Sinclair, S. J. (2001). Determinants of duration of disability and return-to-work after work-related injury and illness: Challenges for future research. *American journal of industrial medicine*, 40(4), 464-484.
- Kreis, J. & Bodeker, W. (2004), *Indicators for work -related health monitoring in Europe* NW: Bremerhaven.
- Laaksonen, M., Mastekaasa, A., Martikainen, P., Rahkonen, O., Piha, K., & Lahelma, E. (2010). Gender differences in sickness absence-the contribution of occupation and workplace. *Scandinavian journal of work, environment & health*, 394-403.
- Law regulating Labour in Rwanda, 2009 (Labour Code) / Itegekorigengaumurimo mu Rwanda, 2009
- Leather, P., Beale, D. & Sullivan, L. (2003). Noise, psychosocial stress and their interaction in the workplace, *Journal of Environmental Psychology*, 23(2): 213-222.

- Leka, S., & Jain, A. (2013). Policy approaches to occupational and organizational health. In G. Bauer & O. Hammig (Eds.), *Bridging Occupational, Organizational and Public Health*. The Netherlands: Springer.
- Leka, S., Jain, A., Iavicoli, S., Vartia, M., & Ertel, M. (2011). The role of policy for the management of psychosocial risks at the workplace in the European Union. *Special Issue on Psychosocial Risk. Safety Science*, 49(4), 558-564.
- Leka, S., Jain, A., Widerszal-Bazyl, M., Żołnierczyk-Zreda, D., & Zwetsloot, G., (2011). Developing a standard for psychosocial risk management: PAS1010. *Safety Science*. 49(7), 1047-1057.
- Lloyd, A.J. (2001). The extent of patients' understanding of the risk of treatments, *Quality and Safety in Health Care*, 10, 14-18.
- Loerbroeks, A., Gadinger, M. C., Bosch, J. A., Stürmer, T., & Amelang, M. (2010). Work-related stress, inability to relax after work and risk of adult asthma: a population-based cohort study. *Allergy*, 65(10), 1298-1305.
- Mailu, J. M. (2016). *Establishing employee's perception on occupational health and safety concerns at East African Portland cement* (Doctoral dissertation, COHES, JKUAT).
- Manyele S.V., Anicetus H. (2006). Management of medical waste in Tanzanian hospitals. *Tanzania Health Research Bulletin*; 8, 177-82.
- Manyele S.V., Ngonyani, H. & Eliakimu, E. (2008). The status of occupational safety among health service providers in hospitals in Tanzania. *Tanzania Journal of Health Research*, 10(2), 81-97.
- Marmot, M., & Wilkinson, R. G. (Eds.) (2006). *Social determinants of health*. Oxford: Oxford University Press.
- Mashoto, K. O., Mubyazi, G. M., Mohamed, H., & Malebo, H. M. (2013). Self-reported occupational exposure to HIV and factors influencing its

management practice: a study of healthcare workers in Tumbi and Dodoma Hospitals, Tanzania. *BMC health services research*, 13(1), 276.

McElvenny, D. M., Armstrong, B. G., Järup, L., & Higgins, J. P. (2004). Meta-analysis in occupational epidemiology: a review of practice. *Occupational Medicine*, 54(5), 336-344.

Melissa A. M. (2014). Hazards of the Health Care Sector: Looking Beyond Infectious Disease. *Annals of Global Health* 80,315-319.

Merete, L.O.T, (2006). *Work environment factors associated with long-term sickness absence and return to work*. National Institute of Occupational Health Copenhagen, Denmark.

Mgone, C. S., & Makanga, M. (2010). Fighting HIV/AIDS, tuberculosis and malaria: one world, one partnership. *Tropical Medicine & International Health*, 15(8), 973-974.

Michie, S. and Williams, S. (2003). Reducing work-related psychological ill health and sickness absence: a systematic literature review, *Occupational and Environment Medicine*, 60, 3– 9.

Mohsen Tavakol and RegDennick (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education* 2, 53-55

Mosweu E., Sebitloane, H.M, & Moodley, J. (2005). Occupational exposure to HIV amongst health care workers in the maternity unit at King Edward VIII hospital, Durban, South Africa. *Obstetrics & Gynaecology Forum*; 15, 5-7.

Motamed, N., BabaMahmoodi, F., Khalilian, A., Peykanheirati, M., & Nozari, M. (2006). Knowledge and practices of health care workers and medical students towards universal precautions in hospitals in Mazandaran Province. *Eastern Mediterranean Health Journal*, 12(5), 653..

- Mutemi, D.K. (2005). *A survey of the Occupational Health and Safety Programmes Adopted by Chemical Manufacturing firms in Nairobi* (Unpublished MBA Research Project). University of Nairobi.
- Muthuviknesh, R & Kumar K. A. (2014). The effect of occupational health and safety management on work environment. *International Journal of Advance Research in Computer.Science and Management Studies*, 2 (6); 67.
- National Institute of Occupational Safety and Health (2009). *Identification of research opportunities for the next decade of NORA. State of the Sector: Healthcare and Social Assistance*. NIOSH. Retrieved from: <http://www.cdc.gov/niosh/docs/2009-139/pdfs/2009-139.pdf> (2012).
- Ndejjoet *al.* (2015).On occupational health hazards among health workers in Uganda.*Journal of Environmental and Public Health*; Volume 2015 (2015), Article ID 913741, 9 pages <http://dx.doi.org/10.1155/2015/913741>.
- Neema, J. (2015). *Compliance of occupational health and safety policies and regulations in public hospitals in Mwanza region: A case study of sekou toure hospital* (Doctoral dissertation, Mzumbe University.).
- Newman, C. J., De Vries, D. H., Kanakuze, J. D. A., & Ngendahimana, G. (2011). Workplace violence and gender discrimination in Rwanda's health workforce: Increasing safety and gender equality. *Human Resources for Health*, 9(1), 19.
- Newton, R., Ormerod, M., & Thomas, P. (2007), Disabled people's experiences in the workplace environment in England, *Equal Opportunities International*; 26(6), 610-623.
- Ngulube& Jack, T. (2011).*The Zambia country case study on positive practice environments (PPE): Quality workplaces for quality care*. Geneva, Switzerland: International Council of Nurses.
- NIOSH (National Institute of Occupational Safety and Health) (1997).*Musculoskeletal Disorders and Workplace Factors: A Critical Review*

of Epidemiologic Evidence for Work -Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back , ed. Bernard, B. P, DHHS (NIOSH) Publication No. 97B141.

Nutbeam D. (1996). Achieving ‘best practice’ in health promotion: improving the fit between research and practice. *PubMed Health Educ. Res*, 11,317-326.

Nzuve S.N.M & Ayubu B. L. (2012).The Extent of Compliance with Occupational Safety and Health Regulations at Registered Workplaces in Nairobi Occupational Safety and Health.

OECD, *Social Expenditure Database* 1980-2003 Retrieved from <http://www.oecd.org/els/social/expenditure>.

Orji, E. O. et al. (2002). Occupational health hazards among health care workers in an obstetrics and gynecology unit of a Nigerian teaching hospital. *Journal of Obstetrics &Gynaecology* 22(1), 75–78

Orji, E. O., Fasubaa, O. B., Onwudiegwu, U., Dare, F. O., & Ogunniyi, S. O. (2002). Occupational health hazards among health care workers in an obstetrics and gynaecology unit of a Nigerian teaching hospital. *Journal of obstetrics and gynaecology*, 22(1), 75-78.

Orme, N. M., Rihal, C. S., Gulati, R., Holmes, D. R., Lennon, R. J., Lewis, B. R., ... & Singh, M. (2015). Occupational health hazards of working in the interventional laboratory: a multisite case control study of physicians and allied staff. *Journal of the American College of Cardiology*, 65(8), 820-826

Osuala, E. C. (2007). *Introduction to research methodology*. Africana-FEP Publishers.

Osungbemirol, B.W., Adejumo, O. A. Akinbodewa, A. A. & Adelosoye, A.A. (2016). Assessment of Occupational Health Safety and Hazard among Government Health Workers in Ondo City, Southwest Nigeria *British Journal of Medicine & Medical Research* 13(8), 1-8

- Pouliakas, K. & Theodoropoulos, N. (2010). *Variety of Performance Pay and Firm Performance: Effect of Financial Incentives on Worker Absence and Productivity*, Munich RePEC Personal Archive: No. 18238.
- Pouliakas, K. & Theodossiou, I. (2010b). *Measuring the utility cost of temporary employment contracts before adaptation: A conjoint analysis approach*, *Economical*, International Labour Review forthcoming.
- Pouliakas, K. & Theodossiou, I. (2010a), *Socioeconomic differences in the Satisfaction of High -Pay and Low-Pay Jobs in Europe*, International Labour Review; forthcoming.
- Pruss-Ustun A., Rapiti E. & Hutin, Y. (2003). *Sharp injuries: global burden of disease from sharp injuries to health care workers Geneva, Switzerland*. World Health Organization.
- Pruss-Ustun A., Rapiti E. & Hutin, Y. (2005), Estimation of the global burden of disease, attributable to contaminated sharps injuries among health-care workers. *Am J Ind Med*; 48(6):482-90.
- Rajasekar, S. & Philominathan, P. (2013), *Research Methodology*. Physics. Ed-ph. India.
- Reda, Ayalu A., Fisseha, S., Mengistie, B. & Vandeweerd, J.M. (2010). *Standard precautions: Occupational exposure and behavior of health care workers in Ethiopia*. PLoS One 5, 12. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3009714/>
- Republic of Uganda; Ministry of Health; (2008). *Guidelines; for occupational safety and health, including HIV in the health services sector*. Chapel Hill, NC: Capacity Project.. Retrieved from http://www.capacityproject.org/images/stories/files/guidelines_occupational_safety.pdf

- Reville, R. T. and Schoeni, R. F., (2001). *Disability from Injuries at Work: The Effects on Earnings and Employment*, RAND Institution, Labor and Population Program Working Paper Series, No DRU-2554.
- Sarantakos, S. (2005). *Social research*, Sydney: MacMillan Press Ltd.
- Siegel, J. D., Rhinehart, E., Jackson, M., & Chiarello, L. (2007). Guideline for isolation precautions: preventing transmission of infectious agents in health care settings, *American Journal of Infection Control*, 35 (2), 65–S164.
- Slovic P. (2000). *The perception of risk*, London: Earth scan Publications.
- Slovic, P., Fischhoff, B., & Lichtenstein, S. (1982). *Facts versus fears: understanding perceived risk*. In: Kahneman D, Slovic P, Tversky A, (eds). *Judgement under uncertainty: heuristics and biases*. Cambridge: Cambridge University Press.
- Smith, A. (1776). *An Inquiry into the Nature and Consequences of the Wealth of Nations*, London: Methuen & Co. Ltd.
- Smith, M.R. & Roy, T.A. (2007). Authentic leader creating healthy work environments for nursing practice. *American J. Critical Care*, 15: 256-267.
- Sofola O.O., Folayan, M.O., Denloye O.O., Okeigbemen S.A. (2007). Occupational exposure to blood borne pathogens and management of exposure incidents in Nigerian dental schools. *Journal of Dental Education*; 71(6):832-7.
- Steers, R. M. & Rhodes, S. N. (1978). Major influences on employee attendance: a process model, *Journal of Applied Psychology*, 63: 391-407.
- Stolk, C. V., Staetsky, L., Hassan, E., & Woo Kim, C. (2012). Management of psychosocial risks at work: an analysis of the findings of the European Survey of Enterprises on New and Emerging Risks (ESENER). *European Risk Observatory Report*. European Agency for Safety and Health at Work. doi, 10, 92077.

- Strong, L. L. & Zimmerman, F. J. (2005). Occupational Injury and Absence From Work Among African American. *The Occupational Safety and Health Act No. of 2007*
- Swaen, G.M.H., Haidar, S., Burns, C.J., *et al.* (2007). Mortality study update of acrylamide workers, *Occupational and Environmental Medicine*, 64(6), 396-401.
- Thaler, R.H. and Sunstein, C.R. (2008). *Nudge: Improving Decisions about Health, Wealth and Happiness*, London: Penguin Books.
- Thomsen, C., McClain, J., Rosenman, K., & Davis, L. (2007). Indicators for occupational health surveillance. *MMWR Recomm Rep*, 56(RR-1), 1-7.
- Tochikubo, O., Ikeda, A., Miyajima, E. and Ishii, M. (1996). Effects of Insufficient Sleep on Blood Pressure Monitored by a New Multibio medical Recorder, *Hypertension*, 27, 1318-1324.
- Tolera, T. B. (2016). Occupational Hazards In Construction Industry: Case Studies From Housing And Construction Workers At Addis Ababa, Ethiopia. *International Journal of Research-Granthaalayah*, 4(9), 84-96.
- Tüchsen, F, Christensen, K.B., and Lund, T. (2008), Shift work and sickness absence. *Occupational Medicine*, 58(4), 302-304.
- Tüchsen, F., Christensen, K. B., Fèveile, K.&Dyreborg, J., (2009). Work injuries and disability, *Journal of Safety Research*, 40, 21-24.
- Tversky, A. & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases, *Science*, 185, 1124-1131.
- Utomi I.L. (2006). Occupational exposures and infection control among students in Nigerian dental schools. *Odonto-stomatologietropicale. Tropical Dental Journal*; 29(116), 35-40.

- Vaz, K., McGrowder, D., Alexander-Lindo, R., Gordon, L., Brown, P., & Irving, R. (2010). Knowledge, awareness and compliance with universal precautions among health care workers at the University Hospital of the West Indies, Jamaica. *The international journal of occupational and environmental medicine*, 1(4 October).
- Vaz, K., McGrowder, D., Alexander-Lindo, R., Gordon, L., Brown, P., & Irving, R. (2010). Knowledge, awareness and compliance with universal precautions among health care workers at the University Hospital of the West Indies, Jamaica. *The international journal of occupational and environmental medicine*, 1(4 October).
- Vaz, K., McGrowder, D., Crawford, T., Alexander-Lindo, R., & Irving, R. (2010). Prevalence of injuries and reporting of accidents among health care workers at the University Hospital of the West Indies. *International journal of occupational medicine and environmental health*, 23(2), 133-143.
- Verbeek, J., Pulliainen, M. & Kankaanpää E: (2009). A systematic review of occupational safety and health business cases. *Scand J Work Environ Health* 35, 403-412.
- Wei, X. (2007). Wage compensation for job-related illness: Evidence from a matched employer and employee survey in the UK, *Journal of Risk and Uncertainty*; 34, 85-98.
- Weil, D. (2001). Valuing the economic consequences of work in jury and illness: A comparison of methods and findings, *American Journal of Industrial Medicine*; 40(4), 418-437.
- Wergeland, E., Veiersted, B., Ingre, M. (2003), A shorter workday as a means of reducing the occurrence of musculoskeletal disorders, *Scandinavian Journal of Work, Environment and Health*; 29(1), 27-34.

- Wilson, D.J., Takahashi, K., Smith, D.R., (2006). Recent Trends in ILO Conventions Related to Occupational Safety and Health. *International Journal of Occupational Safety and Ergonomics* 12(3), 255–266.
- Wilson, D.J., Takahashi, K., Sakuragi S. (2007). The Ratification Status of ILO Conventions Related to Occupational Safety and Health and its Relationship with Reported Occupational Fatality Rates. *Journal of Occupational Health*, 49, 72-79.
- Wooden (1990). Factors associated with Workplace Accidents: Evidence from the 1983 Health Survey. *The Journal of Occupational Health and Safety Australia and New Zealand*, 6(2), 97-102.
- World Health Organization (WHO).(2009). *WHO guidelines on hand hygiene in health care*. Retrieved from http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf.
- Yassi, A., Lockhart, K., Copes, R., Kerr, M., Corbiere, M., Bryce, E., ... & Fitzgerald, M. (2007). Determinants of healthcare workers' compliance with infection control procedures. *Healthcare Quarterly*, 10(1), 44.
- Yokoe, D.S & Classen, D. (2008). Improving patient safety through infection control: a new healthcare imperative. *Infect Control Hosp. Epidemiol.*; 29 (1), 3–11.
- Yokoe, D.S, *et al.*(2008). A compendium of strategies to prevent healthcare-associated infections in acute care hospitals. *Infect Control Hosp. Epidemiol.*; 29, 12.

APPENDICES

Appendix I: Consent Form for Interview of Participants



JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, KIGALI CAMPUS

CONSENT FORM FOR Interview of Participants:

Title: Occupational Health Hazard: Associated Factors and Compliance to Occupational Safety Measures in the Health Facilities in Kigali, Rwanda

Supervisor; Prof: SIMON KARANJA

Hello, you are all welcome' I am Nwankwo Mercy, a PHD student of JOMO Kenyatta University of Agriculture and Technology, Kigali Campus. I need to ask some questions to enable me gather information on health issues.

This interaction is to enable me assess what you know about occupational hazards and evaluate compliance to safety international standard measures in your practices.

Information you give in response to the several questions options are in connection with occupational hazards.

Feel free to respond to these questions and be assured that your secrets are kept without disclosure to anyone except by your permission. The privacy and confidentiality of the information supplied are guaranteed. Also you are free to stop at any time you want in the study and no penalty will be given to you and every other benefit given to other participants will be given to you.

There is no risk to your health from participating in this study. All of the questions will be about health and what you know and about health hazards in work places. Sometimes answering questions like this can be difficult. If the questions are upsetting or if you do not want to answer a question for any reason, you do not have to.

I hope that the answers will help us discover factors associated with occupational hazards and the compliance to safety regulations in the health institutions to help limit hazards in work places. If you have any questions or concerns about what you are asked, you are free to ask at any time during the discussion or in private at another time.

Contact Nwankwo Mercy

Phone +250785701775 or email:mercynjkuat@gmail.com

Do you agree to participate in this study? **Yes (PROCEED) No (STOP)**

[I have explained this research study to the subject_____

Interviewer/Witness to Assent Procedures

Date

(To be signed by interviewer after subject has verbally assented).

Participant:

I agree to participate. ...-----

(Participants' Signature.) Date

If the participant refuses:

I am sorry you will not be able to participate in this discussion. Thank you for your time.

From the survey consent form

Appendix II: Questionnaire

Quantitative component Study Questionnaire:

May I use this opportunity to plead to you that you supply the necessary information concerning what you know about health safety measures and occupational health hazards. This information will help the government to improve on occupational health safety measures and improved working condition in the country, the answer you give here will be respected. Your name will not be required, thanks for the assistance.

Identification: Put Initials -----

District: i. (Nyarugenge) , ii. (Kicukiro), iii. (Gasabo)

Name of the health facility: _____

Date:

Answer these questions as it applied to you: You can opt for more than one response from these questions.

Study participants Socio-demographic characteristics;

A. Age: _____ (Years)

B. Gender: Male Female

Respondent's Profession	Tick your profession
Medical officer	
Specialist	
Nurse	
Midwife in maternity unit	
Dentist	
Laboratory Scientist / Technician	

Pharmacist / Pharmacy Technician	
Anaesthetists / theatre worker	
Cleaner / potter	
Mortician	
Workers in the sterilizing Unit	
Maintenance Staff	
Hospital Management Staff	
Occupational Safety Staff	

Respondent Background Characteristics	YES	NO
Sex:		
Male		
Female		
District Name / Health Facility:		
Nyarugenge (Muhima)		
Gasabo (Kibagabaga)		
Kicukiro (Masaka)		
Age group of the study Participants		
18 to 29years		
30 to 39years		
40 to 49		
50 years and above		
Duration in service / Length of years of service		
Less than 3 years		
Between 3 and 6 years		
Between 7 to 9 years		
10 Years and above		
Participants Education:		
None		

Primary
 Secondary
 Diploma / Certificate
 Degree
 Post Graduate

History of habits

Whether smoking or not
 Whether taking alcohol or not

A. Existence of occupational health and safety in the health Facility

Existence of occupational health and safety in the health Facility	YES	No
Health Facility have Occupational health and safety chief		
Health Facility have Occupational health and safety programs		

C. Questions on study participants work history

Study Participant work history	Yes	No
Participants doing Other Jobs		
Working Night shift		

Number of days worked per week:

5 days
 6 days
 7 days

Number of hours worked per day

7 hours

8 hours

9 hours

10 hours

11 hours

12 hours

D: Questions on awareness of occupational health and safety program in the work place that must be enforced

Awareness of occupational health safety program elements	Disagre e	Neutra l	Agre e
--	--------------	-------------	-----------

1. Work safety responsibility
 2. Health facility safety
 3. Employee orientation/ training
 4. Work space inspection/ supervision
 5. First Aid
 6. Health and Safety Promotion
 7. Reporting and investigation accidents/incidents
-

E. Questions on workers opinion of safety measures in their workplace

Workers opinion of safety measures in their workplace	Strongly disagree	Disagree	Undecided Freq.	Agree Freq.	Strongly agree
--	--------------------------	-----------------	------------------------	--------------------	-----------------------

1. Workplace contains harmful chemical, gases and contaminated blood products:
2. Task are performed either in prolonged standing or sitting position
3. Exposure to condition like tuberculosis, HIV & AIDS infection, asthma, hepatitis, heart disorders are common in workplace
4. Safety awareness can be enhanced by training and communication
5. Wearing glove / boots can reduce damage to hands and foot
6. Wearing apron can reduce physical damage to your body
7. Wearing mask can reduce damage to respiratory organs
8. Washing hands after work can prevent

diarrheal diseases

9. Record of accident frequency and severity rates

F. Questions on the health facility safety prevention strategies

Health facility safety prevention strategies in place	Yes	No
1. Safety rules and policy in the health facility		
2. Hazard / accident investigation and reporting		
3. Regular workers Health and safety training		
4. Health and safety monitoring and audit		
5. Health hazards communication and surveillance system		
6. Equipment procurement and maintenance system		
7. Incorporating safety-engineered protection mechanisms in several units		
8. First Aid medical services		
9. Health insurance system for workers		
10. Workers pre- and post- job placement screening, treatment and control of non-socomial infection		
11. Research capacity building on workplace safety related issues		
12. Dealing with hazardous hospital wastes		

G. Questions on the health facility safety activities

Health facility safety activities	Yes	No
1. Promotion of safety awareness and safety program		
2. Regular equipment maintenance		
3. Workplace inspection / supervision		
4. Provision of work safety guidelines and safety information		
5. Job training and placement		
6. Providing medical and first aid facilities		
7. Reporting and investigating all accidents / incidents		
8. Enforcing health and safety regulations		

Questions on the hazards elimination and control measure in the health facilities

Hazards elimination and control measure in the health facilities	Strongly Disagree		Disagree		Undecided		Agree		Strongly Agree	
Question on hazard control measures in health facility										

Eliminating risk of hazards among workers through risk containment, engineering and safety training
 Ability to correct a potential hazard
 Time deadlines set for the correction of potential hazards

Hospital workers are provided with safety information
 All the occupational safety health standards in hospital are in place
 Employer makes every effort to keep away unnecessary stress in the workplace
 Hospital workers are well informed of the controls measures for hazards
 There are supervisors' assigned responsibilities to ensure hazard controls
 Implementation of controls is tracked to completion

H. Questions on the types of hazards report system used in the health facility

Types of hazards report system used in the	Yes	No
1. Injuries or illnesses		
2. Incidents or near misses		
3. Property loss or damage		
4. Environmental damage		
5. Disability and loss		
6. Mental health problem		

4. The proportion of occupational health hazards cases

Proportion of occupational hazards cases among health worker in the health facility (2015 – 2016)

Question on Proportion of Occupational hazards cases in health facility

Working accidents

Slips and Falls

Injury with Blood borne pathogen

Hazardous waste

Confined space

Chemical splash

Violence and molestation

Table: Proportion of occupational hazards health outcomes among health worker in the health facility (2015 – 2016)

Question on Proportion of Occupational health hazard outcome cases in health facility

Yes

No

Backache

Lung disease

Over time with Stress

High blood pressure

AIDS

Cancer

Asthma

5. Types of occupational hazards cases known by the health care workers

Questions on Types of occupational health hazards cases known by the health care workers

The Different types of occupational hazards cases that exist in the health facilities in Kigali Rwanda.

Question on Types of Occupational hazards cases experienced in health facility	Yes	No
Working accidents		
Injury with Blood borne		
Insect and animal bites		
Contagious Waste hazards		
Fire outbreaks with burns		
Violence and assault		
Chemicals splash		
Confined spaces		
Assault and abuses		

The Different types of occupational hazards health outcome cases that exist in the health facilities in Kigali Rwanda.

Question on Types of Occupational hazards		
health outcomes experienced in health facility	Yes	No
Cuts and tissue damage		
Neck pain		
Body pain		
Back pain		
Stress / Psychosocial problems		
Injuries, cuts and fracture		
Blood borne infection		
Sprain		
Allergic reaction to skin, eye		
Air burn infection		
Asthma and Tuberculosis		
Allergic reaction to the body		
Allergic reaction and poisoning		
Burn out from work pressure		

3. Individual level related factors influencing occupational health hazards `

Questions on Individual related factors influencing occupational health hazards

Person- level factors influencing occupational health hazards	Stro					
	ngly	Disa	Disa	Undec	Ag	Strongly
	gree	gree	ided	ree	Agree	

1. Negligence of safety procedure, hygiene rules and carelessness
2. Poor knowledge on use of protective and safety equipment
3. Poor job training, skill and experience
4. Body sensitivity and reaction to some medical devices
5. Distraction with other personal issues
6. Lack of job motivation
7. Absence of insurance cover
8. Workers pre- existing disease
9. Multiple job place to improve earning

4. Health facility related factors influencing occupational health hazards.

Questions on Health facility related factors influencing occupational health hazards.

	Strongly	Disagree	Undecided	Agree	Strongly Agree
Health facility determinant factors					

1. Constant work over load and extended work time due to shortage of staff
2. Poor infrastructures, housekeeping and hygiene
3. Unclear procedure rules and absence of job supervision
4. Poor equipment's maintenance system
5. Absence of Fire emergency drills and safety equipment's
6. Poor safety information communication and hazard reporting system
7. Insufficient job safety training
8. Breakdown of safety policy
9. Un responsive health management team

5. Medical waste management practices in the health facilities

Questions on Medical waste management practices in the health facilities.

	Yes	No
Questions on waste management		
1. Are the chemical, physical and biological substances and agents under their control are without risk to health		
2. Are there appropriate measures of protection taken against accidents		
3. Do the waste management workers gets safety instructions and training from managers and occupational safety staff		
4. Do the hospital management provides regular supervision of work practices, and enforces the application and use of occupational safety and health measures		
5. Do hospital management provides adequate personal protective clothing and equipment		
6. Respects to hours of work and rest breaks observed in work place		
7. Do they Provide first aid for emergency and accidents		
8. Whether they conduct research to keep track and address emerging health issues		

Health facility inspection

Inspection component	Observation	Recommendation
Location of the Hospital Environmental Management practices Environmental protection permits and practices Health facility environment safety design Waste management practices:		
Solid waste		
Liquid wastes		
Radio active waste Documentation practices Wastes handlers practices Evidence of workers safety training Evidence of safety communication and report system		

6. Compliance to Occupational safety Practices in Workplace

Questions on Compliance to Occupational safety Practices in Workplace

Compliance to Occupational safety Practices in Workplace	Yes	No
1. Hand washing after any direct contact with Patient		
2. Safe collection and disposal of sharps		
3. Use of Gloves for contact with body fluids, non-intact skin and mucous		
4. Wearing a mask, eye protection and a gown if blood or other body fluid		
5. Do you always covering all cuts and abrasions sustained during work		
6. Do you comply with dispose of used personal protective equipment safely		

Questions on Compliance to post exposure universal precautions

	Yes	No
Compliance to post exposure universal precautions		
1. Are there guidelines outlining all procedures		
2. Immediately washing hands and other skin surfaces after contact with blood		
3. Careful handling and disposing of sharp instruments during and after		
4. Any Support and counselling programs for workers exposed to hazards		
5. Any provision of post-exposure prophylactic medication for high-risk job		
6. Are you Immunized against diseases like hepatitis, tuberculosis early		
7. Exposed health care personnel's should be advised to use precautions,		
8. Re- evaluation of exposed health care workers in 72 hours		
9. People who are at substantial risk for blood borne infections may need		
10. Use of Droplet Precautions until patients have received 48 hours of appropriate therapy chemo-prophylaxis		

Hospital Occupational Health and Safety Policy Compliance Questions

Hospital Occupational health and safety policy and employee Participation on Occupational health and safety	Yes	No
---	-----	----

1. Does health facility have a Health and Safety committee
2. Are there specific written, statement, goals, contracts language or other document describing functions, duties and authorities of health and safety committee
3. Does the committee meet consistently at a regular schedule time and place
4. Are the committee's agendas and minutes distributed to all employees, or posted in a way that makes them accessible to all employees
5. Are there formal procedures for employees to report health and safety hazards, problems, issues or concerns
6. Is there a formal "feedback" system for responding to employees' concerns
7. Are there special procedures for handling immediate health and safety problems (other than emergency response), e.g. stopping an unsafe job,?
8. Does the hospital offer any health and safety incentive programs
9. Are employees allowed to conduct health and safety activities like training, meetings and accident

investigation on work time?

10. Are there work supervisors that participate in the identification and elimination of workplace hazards
 11. Do the work supervisors participate in developing or revising health and safety practices and/or policies
 12. Do workers have clear communication channels for getting health and safety information
 13. Are investigations/analyses performed for all accidents resulting in injury, regardless of how minor they may be and reported
 14. Are any employees subject to medical surveillance or monitoring for specific hazards (e.g. noise)?
-

Hospital management and leadership Commitment to occupational safety Policy Guideline

Management and leadership Commitment to occupational safety Policy Guideline					
Result of Respondent	Strongly Disagree	Undecided	Agree	Strongly Agree	
Management and leadership Commitment to safety Policy Guideline	Disagree			Agree	

1. Your hospital Health and Safety Programme are re-evaluated and/or updated on regular

basis

2. Does management set formal, annual health and safety goals for the hospital
3. There is health and safety signed policy statement that specifically m
4. There is an annual health and safety budget designated for control me
5. Performance of Health and safety is a formal part of managers' performance
6. Is health and safety a formal part of hospital supervisors 'performance
7. Full-time employees have health and safety as their primary responsibility

Study participants' opinion on Factor resulting to Poor policy enforcement

Respondent	Opinion on	Strongly Disagree	Undecided	Agree	Strongly Agree
Factor resulting to Poor policy enforcement(n=249)	Disagree				Agree

1. Poor policy implementation and regulation
 2. Forgetfulness of the right procedures and distractions
 3. Poor timing of work scheduled and carelessness
 4. Unsafe working environment
 5. Poor policy enforcement system
 6. Occupational hygiene practices
-

Questionnaires for the hospital Management

Top hospital management responses on safety leadership compliance

Management Leadership (n = 9)	Yes	No
There is a written policy supporting the safety and health management system.		
The management defines effective worker health and safety goals and expectations.		
They assign responsibility and are accountable for the work and maintenances too.		
Ensures effective communication for workers health and safety goals and expectations.		
Everyone in the hospital knows who has been assigned responsibility for the program.		
Allocates appropriate resources (funds and time) to accomplish goals and manage the program.		
Recognizes employee contributions to worker safety and health at the hospital.		
Routinely demonstrates visible commitment to the safety program.		

Hazard Identification

Hazards identification in the hospital (n = 9)	Yes	No
Regularly review of written materials such as OSHA logs and workers' complain claims,		
Review of written materials on results of workplace inspections,		
Review of incident investigation reports, and manufacturers' literature to help identify hazards.		
Inspection of hospital physical environment to identify conditions that poses threat to workers safety.		

Ask employees about hazards and safety concerns in their work areas during rounds.		
Investigates incidents to identify any previously unrecognized hazards.		
Conducts all inspections and exposure assessments required by OSHA.		
Identifies hazards associated with emergencies and non-routine operations.		
Informs employees of hazards in their work areas.		
Review all contractor job plans for safety and hazards, prevention, and control.		
Receives contractor's complaints on likely hazards provoking situations for mitigation purposes.		
Informs all contractors of the hazards they may encounter during their work on site.		

Policy Implementation and Compliance Gap Analysis

Strategic objectives	Achievement status	Existing Gap/ Challenges	Action plan
-----------------------------	---------------------------	---------------------------------	--------------------

Policy provides operational guidance on Negative Incident Reporting, Incident Investigation, Reporting and Handling of Accidents/Injuries While on Duty, No Smoking of Tobacco Products on Hospital Premises and Taking Alcohol, Abuse of Drugs and Other Substances in District Hospitals Manual Handling (Lifting of Loads), Storage and Labeling on Flammable Products, Storage of

Hazardous Materials and
Dangerous Goods, Purchase of
Hazardous Materials and
Dangerous Goods
Radio and Other Noise Making
Devices in Hospital Settings
Fire Extinguishers Use
Monitoring Data on Incidents,
Injuries and other Events
Hazards and Risk reduction
Handling Storage and Disposal of
Clinical and other Waste
Safety committee and
responsibilities

Focus group discussion

Site:	Kigali	Moderator:
-------	---------------	------------

Number of Men: Women: Note-
participants: taker:

Date:

Start time:

End time:

Question Theme	Question and probe
Q1. Theme: Health Problems in workplace	“Why do you think health problems occur in your workplace? Probe question: What is the standard for working hours? “What do you think contributes to the health problems in your workplace?
Q2 Theme: Determinants of Occupational health problems	<i>Probe question: “Why do people get infected with HIV while they use personal protective equipments?”</i> <i>Probe question: “Except that you are not giving time of break / rest in between job, anything else?”</i> <i>Probe question: “Do you have regular supply of personal protective equipments: gloves, mask, boots and glass?”</i> <i>Probe question: “What do you put on when you have washed your uniform?”</i> <i>Probe question: “If we estimate, what percentage of incident cases have you had in your respective health facilities?”</i>
Q3 Theme: Institution Compliance health and safety	“Tell me how occupational hazards and safety issues are handled in you workplace?”

Q4. Theme: “Are there thing you consider very bad and threat to your job?”

Work place risks

Still on Compliance health and safety “What about participating in safety committee meetings and post exposure safety practices”

Q5. Theme: Probe question: “Are there guidelines / instructions that are hung somewhere?”

Workplace incidents / occupational hazards that needs to be reported and notified.

Q6.Theme: *Probe question: are there guidelines about precautions which are hung somewhere at your working place?*

Accident incident reporting system

Q.7. Theme: “What do you know about incident report in workplace?”

Future Action Plan

Appendix III: Ethical Approval to conduct Research

REPUBLIC OF RWANDA/REPUBLIQUE DU RWANDA



NATIONAL ETHICS COMMITTEE / COMITE NATIONAL D'ETHIQUE

Telephone: (250) 2 55 10 78 84

E-mail: info@rnecrwanda.org

Web site: www.rnecrwanda.org

Ministry of Health

P.O. Box. 84

Kigali, Rwanda.

FWA Assurance No. 00001973

IRB 00001497 of IORG0001100

30 October, 2015

No.341/RNEC/2015

Nwankwo Mercy Chinenye

Principal Investigator

Your Project title "Occupation health and mitigation strategies in health facilities in Kigali, Rwanda" has been evaluated by the Rwanda National Ethics committee.

Name	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Dr. Jean-Baptiste MAZARATI	Biomedical Services (BIOS)	x		
Prof. Eugène RUTEMBESA	University of Rwanda	X		
Dr. Laetitia NYIRAZINYOYE	University of Rwanda (school of public Health)		x	
Prof. Alexandre LYAMBABAJE	University of Rwanda	X		
Ms. Françoise UWINGABIYE	Lawyer at Musanze	X		
Dr. Egide KAYITARE	University of Rwanda	X		
Sr. Domitilla MUKANTABANA	Kabgayi Nursing and Midwife school	X		

Mr. David K. TUMUSIIME	Kigali Health institute	X		
Dr. Lisine TUYISENGE	Kigali Teaching Hospital	X		
Dr. Claude MUVUNYI	Biomedical Services (BIOS)		x	

After reviewing your protocol during the RNEC meeting of October 10, 2015 where quorum was met, and revisions made on the advice of the RNEC submitted on 3 November, 2015, **Approval letter has been granted to your study.**

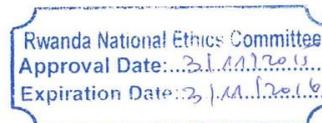
Please note that approval of the protocol and consent form is valid for **12 months**. You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrollment of participants
3. All consent forms signed by subjects should be retained on file. The RNEC may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the RNEC in a timely fashion and before expiry of this approval.
5. Failure to submit a continuing review application will result in termination of the study.
6. Notify the Rwanda National Ethics committee once the study is finished.

Sincerely,

Date of Approval 3 November, 2015
Expiration date: 2 November, 2016

Dr. Jean- Baptiste MAZARATI
Chairperson, Rwanda National Ethics Committee.



Appendix IV: Authorization Letter to Conduct Research

REPUBLIC OF RWANDA



MINISTRY OF HEALTH
P.O. BOX 84 KIGALI
www.moh.gov.rw

Kigali, 29 DEC 2015
N°20/ 5844 DGPHFIS/2015



NWANKWO MERCY CHINENYE
Jomo Kenyatta University of Agriculture and Technology
KIGALI Campus
PHONE: (+250) 785701775
Email: mercynjkuat@gmail.com

Dear Nwankwo Mercy Chinenye,

RE: Your request for authorization to conduct research in health facilities

With reference to your letter requesting for the authorization to conduct a study entitled "Occupational Health Hazard: Associated Factors and Mitigation Strategies in Health Facilities in Kigali, Rwanda", the RBC Collaboration Approval Note N° 65/RBC/NCDs/2015, and the RNEC Ethical Clearance N° 341/RNEC/2015;

I am pleased to inform you that you are authorised to go ahead and conduct your research in the sampled health facilities in Kigali.

However, you are also hereby requested to keep in touch with the Division in charge of Non-Communicable Diseases in RBC and the Clinical Services Directorate General in the Ministry of Health for appropriate implementation of the study.

Sincerely,

Dr. Agnes BINAGWAHO
Minister of Health

Cc:

- Acting Director General of Rwanda Biomedical Center (RBC)
 - Director General of Clinical and Public Health Services
- KIGALI**

Appendix V: Approval Letter from Ministry of Education Rwanda

REPUBLIC OF RWANDA

Kigali, 11/02/2016...
N° 0209...../12.00/2016



MINISTRY OF EDUCATION
P.O.BOX 622 KIGALI

Nwankwo Mercy Chinenye,
Ph.D student in Public Health
Jomo Kenyatta University of Agriculture and Technology-Kigali Campus

Email: mercynjkuat@gmail.com

Dear Ms. Mercy Chinenye,

RE: Approval to Conduct Research in Rwanda under the Project Title: “Occupational Health and Mitigation Strategies in Health Facilities in Kigali, Rwanda”

I am pleased to attach a copy of research clearance, which has been granted to you to conduct research on the above title.

I wish to remind you that the research clearance number should be cited in your final research report. The research should be carried out under affiliation of Jomo Kenyatta University of Agriculture and Technology-Kigali Campus, under supervision of **Dr. Hilda Vasathakaalam**, Lecturer at JKUAT-Kigali Campus.

You are requested to submit the progress report after six months and final report after completion of your research activities to the Ministry of Education of Rwanda.

I wish you success in your research.

Yours sincerely,

MINISTÈRE DE L'ÉDUCATION
GASINGIRWA Marie-Christine, PhD
Director General of Science,
Technology and Research



Marie Christine GASINGIRWA, Ph.D
Director General of Science, Technology and Research
Cc.

- Hon. Minister of Education
- Hon. Minister of State in Charge of Primary and Secondary Education
- Permanent Secretary, Ministry of Education
- Dr. Hilda Vasathakaalam, Lecturer at JKUAT-Kigali Campus