ASSESSMENT OF INFECTION PREVENTION AND CONTROL PRACTICES AMONG HEALTH CARE WORKERS IN PUBLIC HEALTH FACILITIES IN VIHIGA SUB COUNTY, KENYA

BY

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DECLARATION

1. THE STUDENT

I, Paul Waliaula Wekunda do hereby declare that this thesis is my original work and has not been presented for the award of a degree or diploma in any other University or college.

Paul Waliaula Wekunda

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Signature…… Date……

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DEDICATION

I dedicate this thesis to my dear wife, Linet Kurwa; who gave me love, joy and support and to my mother, Mrs. Kanah Wekunda, who loved me and taught me the value of discipline and hard work.

ABSTRACT

Infection prevention and control is not only crucial in protecting patients, health care workers and visitors in health care settings from health care associated infections which are protracted cause of morbidity and mortality but also in preparation and response to communicable disease crisis. Despite the high burden of health care associated infections and need for enhanced prevention and control of these infections in Vihiga Sub County, factors influencing infection prevention and control practices among health care workers had not been determined. The main objective of this study was to assess infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County. The aim was to provide baseline data for implementing infection prevention and control standard precautions in health care facilities. A cross sectional study was carried out in five public health facilities in Vihiga Sub County which were selected through purposive sampling method. Data were collected using self administered structured questionnaires on 173 health care workers, observational checklists and Key Informant Interviews. Collected data were checked, coded and transferred to SPSS version 20 for analysis. Frequency and chi-square were calculated with P-value ≤ 0.05 being considered significant. There was significant association between awareness of other laws concerning infection prevention and cleaning hands before and after attending to patients (χ^2 = 11.198, d.f = 3, P-value 0.011). There was association between provision of resources by administration and hand hygiene (χ^2 = 29.89, d.f = 9, P-value <0.001), use of personal protective equipment by health care workers (χ^2 = 24.994, d.f = 9, P-value 0.003) and segregation of biomedical wastes (χ^2= 37.127, d.f = 9, P-value <0.001). Although health care workers demonstrated sufficient knowledge on basic components of infection prevention and control (84.7%), larger proportion had never read the national IPC guidelines. Reading IPC guidelines appeared to have a better relationship with hand hygiene practices (χ^2= 14.05, d.f = 3, P-value 0.003) and use of PPEs (χ^2 = 7.619, d.f =3, P-value 0.05). The level of health care workers' compliance with infection prevention and control protective measures was below expected threshold (66.95%). Insufficient infection prevention and control resources, negative staff attitude, staff shortage, lack of training and lack of enforcement of infection prevention and control by managers were found to be main barriers to compliance with infection prevention and control standard precautions. From these findings, it was concluded that provision of IPC resources by administration, awareness of other laws and reading national IPC guidelines are prerequisites for better infection prevention and control practices among health care workers. IPC resources should be availed in a timely manner; health care workers should be sensitized on national IPC guidelines on regular basis and IPC support supervision by County and Sub County health management teams should be conducted regularly.

TABLE OF CONTENTS

ABBREVIATIONS

AIDS: Acquired Immunodeficiency Syndrome

CDC: Centre for Disease Control and Prevention.

GOK: Government of Kenya

HAI: Healthcare Associated Infections

HCW: Healthcare Workers

HIV: Human Immunodeficiency Virus

IPC: Infection Prevention and Control

MOH: Ministry Of Health

MOMS: Ministry Of Medical Services

MOPHS: Ministry Of Public Health and Sanitation

PHO: Public Health Officer

PPE: Personal Protective Equipment

TB: Tuberculosis

WHO: World Health Organization

OPERATIONAL TERMS USED IN THIS STUDY

Biomedical wastes: These are wastes which are generated during the diagnosis, treatment or immunization of human beings.

Cadre: A group of people unified by training in a health science.

Contamination: The presence of an infectious agent on a body surface, on or in clothes, beddings, toys, surgical instruments or dressings, or other articles or substances including water and food.

Health care associated infection: Also known as a **hospital-acquired infection** or **Nosocomial infection** is an infection whose development is favored by a hospital environment, such as one acquired by a patient during a hospital visit or one developing among hospital staff. Such infections include fungal and bacterial infections and are aggravated by the reduced resistance of individual patients. An infection acquired in a health care facility setting and is not usually present or incubating on admission.

Health care workers: All people working in health care facilities.

Health system: These are combination of resources, organization, financing and management that culminate in the delivery of health services to the population.

Hygiene: A condition promoting sanitary practices.

Infection: Infection is the entry and development or multiplication of an infectious agent in the body of man or animals. An infection does not always cause illness.

Infection prevention and control: All measures aimed to ensure the protection of those who might be vulnerable to acquiring an infection both in the general community and while receiving care due to health problems, in a range of settings.

National guideline: The national infection prevention and control guidelines for health care services in Kenya.

Personal protective equipment: Are equipment or garments worn to minimize exposure to serious workplace injuries and illnesses resulting from work place hazards.

Public health facilities: These are institutions owned by government where promotion, curative and rehabilitative health care service is provided.

Risk: This is a function of the probability of an adverse health effect and the severity of that effect, consequential to a health care associated infection.

Standard precautions: May also be referred to as **Standard operating procedures (SOPs)** or **infection prevention and control practices**. They are sets of practices that should be used in care of all patients regardless of whether they are known or suspected to be infected with transmissible organism. These practices are critical to producing quality health care service.

Transmission: The process by which an infectious agent is spread or passed from a source to a vulnerable person.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Infection prevention and control is essential cornerstone of clinical care in all healthcare settings (MOMS and MOPHS, 2010). It is not only crucial in protecting patients, health care workers and visitors in health settings from health care associated infections but also in preparation and response to communicable disease crisis (WHO, 2001). The basic principle of infection prevention and control is hygiene; hand hygiene among healthcare workers is universally considered as the single most effective infection prevention and control measure to prevent healthcare associated infections and therefore, it should be given priority (Mani *et al.,* 2010). Other important elements of infection prevention and control include; personal protective equipment, environmental sanitation and hospital waste management.

Health care associated infections are attributable to poor infection prevention and control practices among health care workers leading to cross contamination (Menziez *et al.*, 2007; Burke, 2003). The true global burden of healthcare associated infection is not well known because of the difficulty in gathering reliable data, since most countries lack surveillance systems for health care associated infections (WHO, 2002). However, cases of health care associated infections occur daily throughout the world, from the most developed to the least developed countries (Quoc, 2004). Health care associated infections affect hundreds of millions of people worldwide and are a major global issue for patient safety (Allegranzi and Pittet, 2009). In United States alone health care associated infections were responsible for 99,000 deaths in 2002 and these exceeded deaths attributable to several top ten leading causes of death in United States (Monina, *et al.,* 2007). In developing countries, the burden of healthcare associated infections is

high, the risk is two to twenty times higher than risks in developed countries and the proportions of infected patients frequently exceed 25% (Allegranzi, *et al.,* 2011). A Study conducted in Kilifi district, Kenya indicated that health care associated infections are most often associated with higher mortality than community acquired infections (Aiken *et al.,* 2011).In Vihiga Sub County, the burden of HAI in not known. Because of their widespread in nature, health care associated infections often have a considerable effect on the public (Burke, 2003). Economic burden of healthcare associated infections is high and comprises both direct and indirect factors (WHO, 2002; WHO, 2014). These factors include; prolonged hospital stay, long term disabilities, unwarranted financial burdens to the healthcare institutions, increased costs to the patients, families and communities and emergence of drug resistant microorganisms. These estimates are sobering and reinforce the need for improved detection, investigation, prevention and control of these infections.

The ultimate responsibility for overall performance of infection prevention and control program lies with the government which typically manages the health system through policies, guidelines, provision of resources and strategic plans. For better management of health system, there is need for robust financing (Goldmann and Huskins, 2015). In high income countries including North America and Europe, infection prevention and control measures have been put in place (Mckenzie *et al.,* 2001). These measures include; infection prevention and control as part of routine medical care, training of healthcare staff on IPC, availing and improving IPC resources, environmental sanitation and compliant architectural designs (Monina, *et al.,* 2007). In Kenya, government funding for health care service is persistently far below the Abuja declaration-2001 through which African governments pledged to increase government funding for health care services to at least 15% of total government allocations. In 2009/2010, for instance the

government of Kenya allocated 4.6% of the total financial allocation to health (MOMS and MOPHS, 2009). This is likely to pose a negative consequence in provision of quality health care service.

Healthcare workers play a critical role in provision of healthcare services, the common disregard to infection prevention and control standard precautions is a cause of concern (Burke, 2003; Monina, *et al.,* 2007; WHO, 2002). During the Marburg viral hemorrhagic event in Angola for instance, transmission within health care settings played a major role in amplification of the outbreak (WHO, 2009). Non-compliance with infection prevention and control standard precautions enable pathogens to come into contact with hospital environment, multiply in sufficient numbers, transmit and cause illness in vulnerable population (Allegranzi and Pittet, 2009). Compliance with infection prevention and control standard precautions have been identified as one of the best strategies to combat the problems associated with health care associated infections (WHO, 2002) since sources of health care associated infections are often not known (Monina, *et al.,* 2007) . Studies have demonstrated that knowledge among health care workers plays a key role in compliance with infection prevention and control practices (Njagi *et al.,* 2012; Ogoina *et al.,* 2015 and Pandit *et al.,* 2005). However, knowledge regarding some of the key principles in prevention of health care associated infections, such as high risk population, transmission of health care associated infections, importance of IPC and important elements of IPC, is often overlooked and could potentially result in illness. Some of this knowledge may be acquired through reading infection prevention and control guidelines.

Studies and documentation on infection prevention and control are limited in Kenya. Previous studies indicate that health care associated infections are a serious public health challenge in Kenya (Aiken, *et al.,* 2011) and occur due to sub optimal level of infection prevention and

control practices among health care workers (Omuga, 2011; Gichuhi, *et al*, 2015; Edgeworth, 2001). However, studies cocerning infection prevention and control practices among health care workers has not been conducted in Vihiga Sub County. Factors influencing infection prevention and control practices among health care workers in public health facilities had therefore not been determined.

1.2 Statement of the problem

Health care associated infections account for 50% of all major complications of hospitalization (Gaynes, 1997) and are among leading causes of morbidity and mortality in healthcare settings (Allegranzi and Pittet, 2009). In Vihiga Sub County, health care associated infections are among major challenges in public health facilities. In 2014 for instance, 5.5% of new born babies in Vihiga Sub County developed neonatal sepsis (DHIS, 2014). In addition, 11.6% of HCWs were occupationally exposed to HIV infection in Vihiga Sub County; this proportion was much higher than the proportions in Sabatia Sub County (8.5%), Hamisi Sub County (9.8%), Emuhaya/Luanda (9.4%) and the County proportion of 10%. Furthermore, significant number of surgical site infections are likely underreported since most of these infections become evident after discharge of patients from health facilities. Despite the fact that site improvement and monitoring systems (SIMS) qualitative assessment (2015) marked infection prevention and control in public health facilities in Vihiga Sub County as one of key areas that needed improvement, factors influencing infection and control practices among health care workers in public health facilities in Vihiga Sub County had not been determined. Thus compared with other health activities, infection prevention and control may be regarded inconsiderable by health managers and therefore, infection prevention and control program may be seen as an area where budgetary cuts have least impact.

In an effort to contribute to the understanding of infection prevention and control in public health facilities in Vihiga Sub County, this study was undertaken to identify factors in health care system that influence infection prevention and control practices among health care workers, to determine knowledge and practice of infection prevention and control among healthcare workers and to find barriers to compliance with infection prevention and control standard precautions.

1.3 Justification

Enhancing prevention and control of health care associated infections is necessary since these infections are a serious global problem. To ensure a growing benefit throughout the healthcare service in the public health facilities, it is important for managers of healthcare system and healthcare workers to minimize risks, sources and transmission of healthcare associated infections through compliance with infection prevention and control standard precautions. To achieve this, it is critical to understand factors associated with infection prevention and control practices among health care workers in public health facilities since according to Sub County data base (2014) over 90% of population in Vihiga Sub County seek health care services in public health facilities.

This study therefore identified factors in health care system that influence infection prevention and control practices among health care workers, determined knowledge and practice of infection prevention and control among healthcare workers and found barriers to compliance with infection prevention and control standard precautions in public health facilities, Vihiga Sub County. The purpose of this study was to provide representative information on infection prevention and control practices among health care workers in Vihiga Sub County to form a

basis for formulation of policies, implementation of those policies and strategic planning aimed at control of healthcare associated infections.

1.4 Objectives

1.4.1 Main objective

To assess infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County, Kenya.

1.4.2 Specific objectives

1. To identify factors in health care system that influence infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County.
2. To determine knowledge and practice of infection prevention and control among healthcare workers in public health facilities in Vihiga Sub County.
3. To find barriers to compliance with infection prevention and control standard precautions among health care workers in public health facilities in Vihiga Sub County.

1.5 Research questions

1. What factors in the health care system influence infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County?
2. What is the level of healthcare workers' knowledge towards infection prevention and control in public health facilities in Vihiga Sub County? Do health care workers in public health facilities in Vihiga Sub County practice infection prevention and control?

3. What are barriers to compliance with infection prevention and control standard precautions among health care workers in public health facilities in Vihiga Sub County?

1.6 Study significance

Public health facilities in Vihiga Sub County face numerous challenges in providing high quality health care services to people and high among the challenges are health associated infections. In spite of the risks associated with non-compliance with infection prevention and control standard precautions, there was no documented effort to highlight infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County.

The aim of this study was to outline factors associated with infection prevention and control practices among health care workers in public health facilities thus contributing to provision of health education and promotion for health care workers. Furthermore, this study aimed at contributing to change of health care workers' attitudes that increase risks of healthcare associated infections in public health facilities and adoption and strengthening of behaviors and attitudes that are likely to increase compliance with infection prevention and control standard precautions towards reducing risks posed by healthcare associated infections among healthcare workers, patients, visitors and the general public. This study also aimed at making original contribution to the literature through investigating determinants of infection prevention and control practices among health care workers in public health facilities, this being an important area of public health.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In this chapter the literature relating to infection prevention and control in health facilities and key factors associated with infection prevention and control are explored. Epidemiology of healthcare associated infections is described in section two (2.2); the ways in which the healthcare system influence the IPC practices are covered in section three (2.3); knowledge and practice of infection prevention and control in public health facilities are outlined in section four (2.4); while barriers to compliance with infection prevention and control standard precautions are highlighted in section five (2.5).

2.2 Epidemiology of healthcare associated infections

Health care workers in the resource poor countries are at occupational risks for health care associated infections that are responsible for many illnesses and occasional death (Sepkowitz, 1996). Hospital born babies are at increased risk of neonatal infections due to poor intra-partum and postnatal infection prevention and control practices among health care workers (Zaidi *et al.,* 2005). A study done to establish risks and causes of pediatric hospital-acquired bactraemia in Kilifi District, Kenya indicated that mortality in patients with hospital acquired sepsis is 53% compared with 24% in community acquired sepsis (Aiken *et al.,* 2011). Due to lack of surveillance system, it is difficult to gather reliable data on health care associated infections in public health facilities in Vihiga Sub County.

Many factors in health care facilities promote thriving and transmission of health care associated infections and they include; decreased immunity in patients, increased variety of medical procedures and invasive techniques creating potential routes of infection (WHO, 2008)

Biological agents responsible for healthcare associated infections include viruses *(Ebola Virus*, Human Immunodeficiency Virus (HIV), *Hepatitis B and C* and *Rota Viruses).* Viruses are often responsible for highly infectious and severe illnesses with high case fatality rates, contributing up to 14% of health care associated infections with identifiable pathogens (Bonita *et al.,* 2006). Viruses are also leading etiologies of HAIs in pediatric patients (Quoc, 2004). *Methicilline* resistant *Staphylococcus aureus, Clostridium deficile, Esicherichia coli,* and *Mycobacterium tuberculosis* are among bacteria associated with HAI. Tuberculosis remains a very important occupational risk for healthcare workers in resource poor countries (Michele *et al.,* 1992; WHO, 2009). Median prevalence of latent Tuberculosis infection is 63% in resource poor countries as compared to latent Tuberculosis infection rate in high income countries of 24% (Menziez *et al.,* 2007). According to Bonita and her colleagues (2006), fungi like *Candida albicans* and *Aspergillus* and parasites are also often responsible for HAI.

Risk of acquiring health care associated infections depends on factors related to infectious agent, susceptible host and environment (Smith, *et al.,* 2008). According to Smith *et al.,* 2008, factors related to infectious agent include virulence, capacity to survive in environment and antimicrobial resistance. Factors related to susceptible host include; advanced age, malnutrition, underlying disease and immune-suppression while among factors related to environment include; prolonged hospitalization, invasive procedures and antimicrobial therapy. Transmissions of HAIs often occur via large droplets, direct contact with contaminated material, through inanimate objects or through oral route (Bonita *et al.,* 2006). Poor infection control practices among health

care workers facilitate transmission of health care associated infections (Burke, 2003; WHO, 2002; Allegranzi, *et al.*, 2011, Monina *et al*, 2007).

2.3 The influence of health system on infection prevention and control

2.3.1 Infection prevention and control guidelines, policies, laws

In Kenya, the Ministry of Health is responsible for formulation of guidelines, policies and laws (GoK, 2010). The National Infection Prevention and Control Guidlines for Health Care Services in Kenya (2010) standardize various procedures meant to protect health care workers, patients and visitors from health care associated infections. The guidelines for TB infection prevention and control for health care workers in Kenya (2014) and the Kenya national policy on injection safety and medical waste management (2007) also provide practical information on infection prevention and control in health facilities. Other legal and regulatory frameworks concerned with infection prevention and control in Kenya include; The Public Health Act, Cap. 242 and the Environment Management and Coordination Act (EMCA), 1999. Infection prevention and control guidelines, policies and laws are intended to secure good IPC practice among health care workers through standardization of these practices across all levels of health care settings. A study done in northern Nigeria indicated that large proportion of health care workers was not aware of IPC policies and laws (Amoran and Omwuve, 2013). In Vihiga Sub County, awareness of IPC laws and policies and the impact that awareness has on IPC practices among health care workers were not known.

2.3.2 Infection prevention and control trainings

A study done in two teaching hospitals in Kenya established that occupational health and safety and infection prevention and control components are not included in most curricula for training of major healthcare professionals including clinicians, nurses and laboratory technologists (Njagi, *et al.,* 2012). This study also indicated that some of these healthcare professionals acquire the trainings on IPC through on-job training, seminars and informally through organized talks at work places. A similar study done in two tertiary hospital in Nigeria indicated that more structured trainings provide a better understand among trainees (Ogoina *et al.,* 2015). However, a study conducted by Suchitra and Lakshmi, (2007), established that IPC practices among health care workers may decline over certain duration after the trainings. More frequent and focused infection prevention and control trainings combined with feedback can thus produce a sustained improvement in compliance with IPC standard precaution thus resulting in reduction in rates of health care associated infections (Resenthal, *et al.,* 2005).

2.3.3 Infection prevention and control resources in public health facilities

Despite the need for more resources for effective infection prevention and control, and the need for a surge capacity for IPC programs, infection prevention and control resources have decreased (Allegranzi *et al.,* 2011). Worldwide, inadequate staffing in health care setting is cited as the most common reason for non-performance of essential infection prevention and control programs (WHO, 2002). Infection prevention and control focal persons who have other competing responsibilities may not have enough time available to perform IPC duties (WHO, 2008). A study done by Dettenkofer *et al.,* (2014) found that if basic conditions such as the availability of sufficient space, personal protective equipment and waste management facilities

are met, some improvement in infection prevention and control practices among health care workers may be seen. Another study (Pittet, 2000) revealed that availability and easy access to hand hygiene resources in a timely fashion appear to be necessary preliquisite for appropriate hand hygiene behaviour among health care workers. Various studies elsewhere in Kenya have demonstrated that health workers in public health facilities lack basic infection prevention and control resources such as sufficient water supply, healthcare waste disposal facilities and personal protective equipment (Opondo, *et al.,* 2009; Gichuhi, *et al.,* 2015; Njagi *et al.,* 2012). In public health facilities, the government play a major role in provision of infection prevention and control resources.

2.3.4 Environmental sanitation in public health facilities

A clean hospital environment plays a crucial role in the prevention of health care associated infections in health facilities (MOMS and MOPHS, 2010). The most cost effective and simplest methods of Environmental sanitation are ventilation and disinfection of equipments by use of sterilization and Autoclaving or chemicals (MOH, 2014). Natural cross ventilation plays a key role in providing fresh air that neutralizes micro-organisms responsible for airborne infections (Michelle *et al.,* 1992). Good design of buildings, fixtures and fittings are important to support efficient and effective cleaning (Mani *et al.,* 2010). However, a study to establish whether hospitals in Kenya are prepared to support newborn survival showed that public health facilities are often unable to maintain a safe hygienic environment for patients and healthcare workers, one of key factors that contribute to flourishing of micro-organisms associated with health care associated infections (Opondo *et al.*, 2009).

2.4 The knowledge and practice of infection prevention and control in Public Health facilities

2.4.1 Health workers knowledge

For better infection prevention and control practices among health care workers, there ought to be sufficient knowledge among health staff. Nevertheless, lack of knowledge among health care workers has been identified as one of key factors leading to poor infection prevention and control practice among healthcare workers in developing countries (Allegranzie and Pittet, 2007). Studies have shown that knowledge among health care workers play a key role in prevention and control of health care associated infections (Njagi *et al.*, 2012; Ogoina *et al.*, 2015 and Pandit *et al.*, 2005). However, a study conducted by (Burke, 2003) revealed that positive behavior change among some healthcare workers remains a formidable obstacle in prevention of healthcare associated infections. Acquiring infection prevention and control knowledge is one component in attempting to reduce the likelihood of health care associated infections. More important is the translation of this knowledge into practice. A study conducted by Fashafsheh *et al.*, (2015) to establish knowledge and practice of nursing staff towards IPC in Palestinian hospitals indicated that despite the fact that nurses had fair knowledge, they had good practice. Another cross-sectional study carried out by (Gizaw *et al.*, 2015) to assess knowledge and practice of health workers towards tuberculosis infection control and associated factors in public health facilities of Addis Ababa revealed that significantly high proportion of health care workers had relatively poor knowledge towards tuberculosis infection prevention and control, however, the knowledge was not significantly associated with practice. The gap with these studies is that they have not quantitavely established relationship between reading national infection prevention and control guidelines and IPC practices among health care workers.

2.4.2 Practice of hand hygiene by health care workers

Worldwide, cross infection by healthcare workers with contaminated hands is a major source of HAIs (Burke, 2003). Hand hygiene has long been universally considered as one of the most important infection prevention and control measures to prevent health care associated infections in healthcare settings (WHO, 2014). Hand hygiene can minimize cross-contamination thus reducing the number of disease-causing microorganisms on hands and antibiotic resistance (Larson and Kretzer, 1995). In a health care setting, hand hygiene can be accomplished by routine hand washing with soap (with or without antiseptic agent) or alcohol hand rub and surgical hand scrub using a waterless, alcohol-based antiseptic agent. The purpose and way to do each differs slightly, with alcohol hand rub being preferred when attending to patients (WHO, 2009). Compliance with hand hygiene among healthcare workers is below 50% in health care settings (Mani *et al.,* 2010). In African countries, multimodial hand hygiene promotion is feasible and effective and access to hand rub is critical for its success (Allegranzi *et al.,* 2010). Nevertheless, alcohol hand rubs and other hand washing facilities are not sufficiently available in many rural facilities in Africa (Allegranzi and Pittet, 2009). A study by done by (Gichuhi, *et al.,* 2015) in level four hospitals in Kenya indicated that hand hygiene is practiced better by support staff than technical health care workers at levels of 91.3% of casual workers, 75% of nurses, 71.4% laboratory staff as well as support staff and 57.1% of clinicians respectively. A study revealed this phenomenon may be due to the fact that non technical health care workers are most often under direct supervision of administrators (Sachitra and Lakshmi, 2007).

2.4.3 Use of personal protective equipment in Health care setting

With emergence severe viral infections like HIV, Ebola, Hepatitis B and Influenza and resurgence communicable diseases like Tuberculosis, healthcare workers are at high risk of exposure to the blood born and air born infections (Mckenzie *et al.,* 2001). Availability and use of personal protective equipment is crucial in healthcare practice to protect clients, patients and health care workers from HAI in the healthcare setting (MOMS and MOPHS, 2010). Personal protective equipment includes gloves, masks, eye wear, boots, and respirators among others. Studies indicate that Healthcare facilities in developing countries lack these important resources and those available are underutilized because HCWs and Healthcare managers have not appreciated the importance of personal protective equipment (Allegranzi *et al.,* 2010: Amoran and Amwuve, 2013 and Ogoina *et al.,* 2015)

2.4.4 Management hospital wastes in Kenya

Healthcare wastes are all biological or non-biological wastes produced during diagnosis, analysis and treatment of patients that are discarded and will never be used again (Altin *et al.,* 2003). Hospital wastes mainly consist of four groups wastes: highly infectious wastes, infectious waste, general wastes and sharps. Wastes produced during practice of healthcare services carry a higher potential for infections and injury than any other type of waste (WHO, 1999). Indiscriminate and erratic handling and disposal of waste in healthcare facilities is widely recognized as a source of avoidable infections, and is synonymous with public perception of poor standards of healthcare services (WHO, 2002).

Management of biomedical wastes encompasses identification, segregation, transportation and disposal. A study conducted in a district of Gujarat, India indicated that despite the fact that

many healthcare workers are aware of risks of infections from healthcare wastes, many of them do not know ways of collection, segragation, transportation and disposal of healthcare wastes and this negatively affect their practice (Pandit *et al.,* 2005). Studies conducted elsewhere in Kenya indicated that technical staff better segregated hospital wastes than subordinate workers in healthcare facilities (Njagi, *et al.,* 2012). The best available technology for disposing medical wastes is incineration because the hospital wastes contain higher ratio of combustible wastes of up to 95% (Altin *et al.,* 2003). Nevertheless, in many developing countries, healthcare associated wastes are dumped together with general solid wastes (Goldmann and Huskins, 2015). A study conducted by ministry of health (2007) revealed that healthcare workers from majority of health facilities indiscriminately dump healthcare wastes with other wastes. This study also found that incineration facilities were limited and where available, they were either broken down or improperly used.

2.4.5 Management of medical equipment

Failure to properly disinfect and sterilize reusable medical equipment carries a risk associated with breach of the host barriers (MOPHS and MOMS, 2010). Cleaning of medical equipment must always precede high-level disinfection and sterilization (WHO, 2009). Adherence to the recommended medical equipment processing techniques should improve disinfection and sterilization practices in health care facilities, thereby reducing infections associated with contaminated patient-care items (Rutula and Weber, 2004)

2.5 Barriers to infection prevention and control practices in Public Health facilities

Many factors contribute to non compliance with principles of infection prevetion and control among healthcare workers (WHO, 2008). Lack of instutional commitement to good hand

hygiene is recognised as one of key barriers of infection prevention and control practices among healthcare workers worldwide (Mani *et al.,* 2010). Studies in developing countries indicate that substantial number of HCWs do not understand how hands become infected by different kinds of micro-organisms (Dettenkofer *et al.,* 2004). This has contributed to lack of understanding of correct hand hygiene technique. Other identified barriers to compliance with IPC standard precautions include understaffing, overcrowding in health facilities, poor access to hand washing facilities and irritant contact dermatitis associated with frequent exposure to soap and water. A study done by (Omuga, 2011) to determine factors influencing infection control, prevention and injection safety practices among nurses in medical and surgical wards at Kenyatta National Hospital indicated that despite training and later development of an infection control committee, infection prevention and control practices remained unacceptable. This was attributed to negative attitute among healthcare workers and staff burn out. Another study (Edgeworth, 2001) identified lack of training and staff shortage as key barriers to compliance with infection prevention and control satndard precautions. Although barriers may be similar across cadres of health care workers, the gap is that these studies were conducted on specific cadres hence results may not be generalized.

2.6 Conceptual frame work

Figure 2.1 presents the conceptual framework that guided this study. Two main factors were identified to have an effect on the compliance with infection prevention and control standard precautions: socio-demographic factors of healthcare workers and factors in healthcare system. These factors influence the knowledge of infection prevention and control among health care workers and barriers to compliance with infection prevention and control standard precautions, which are intermediate factors. The intermediate factors have a direct influence to compliance

with infection prevention and control standards precautions (infection prevention and control practices) among health care workers.

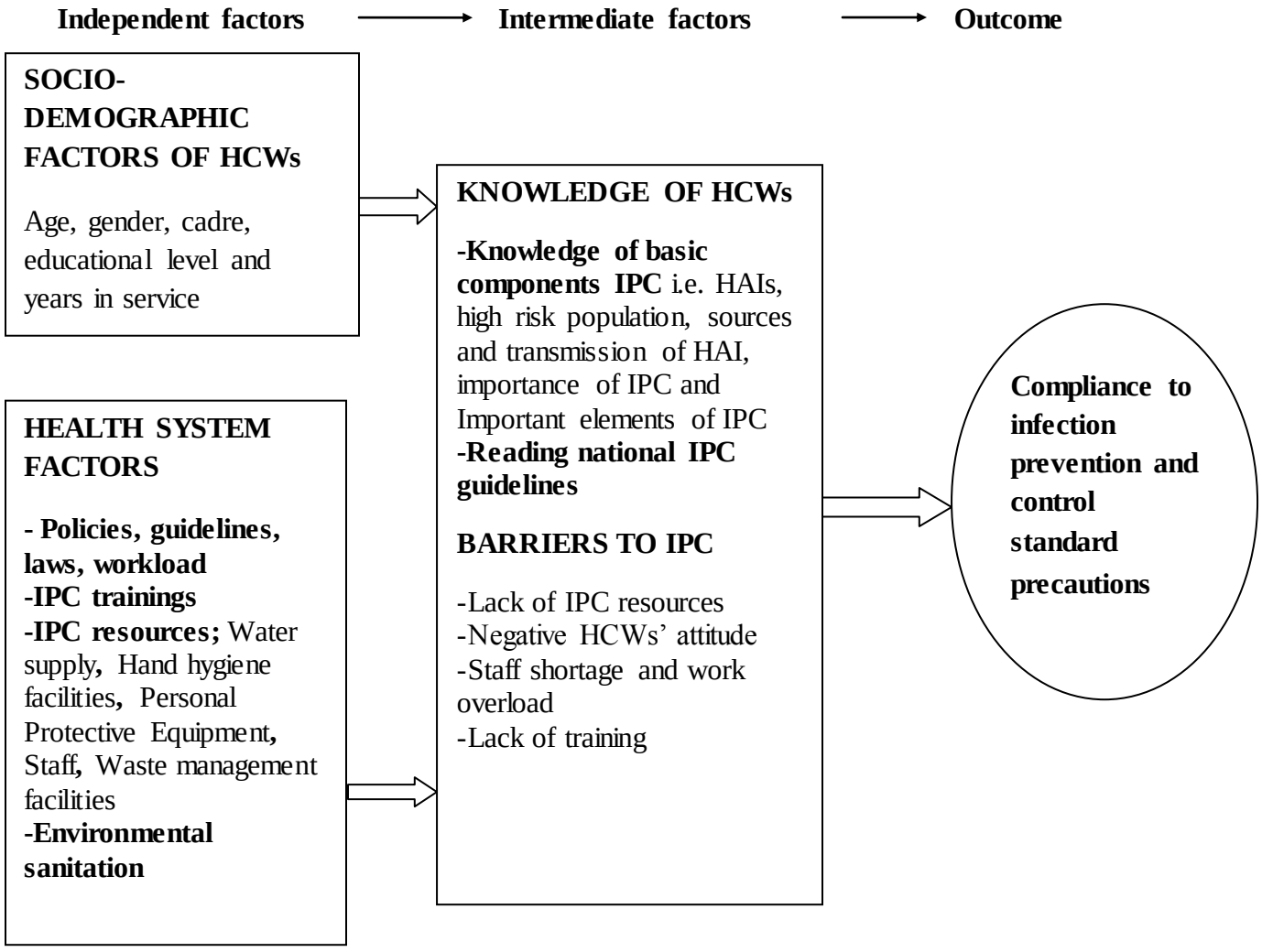

Figure 2.1: Conceptual frame work (source: literature review)

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter outlines procedures and methodology that were used to examine the purpose of the present study and to explore the three objectives presented in chapter one. Section two (3.2) describes the study area; section three (3.3) describes target population; section four (3.4) presents the study design; Section five (3.5) describes how sample size was determined, Section six (3.7) discusses sampling procedure, addressing the sample that was chosen for the study; Section seven (3.7) highlights how participants were recruited for this study. Section eight (3.8) highlights instruments that were used to gather data; Section nine (3.9) describes statistical tools used to analyze data, section ten (3.10) covers ethical considerations for the study and lastly section eleven (3.11) presents potential limitations for this research.

3.2 Study area

Vihiga Sub County is located in Vihiga County, western region of Kenya (Appendix V and VI). Vihiga Sub County has an approximate area 90.2 square kilometers with four administrative wards namely Lugaga/Wamuluma, Central Maragoli, Mungoma and South Maragoli. Vihiga Sub County borders Hamisi Sub County to the East, Sabatia Sub County to the North, Emuhaya Sub County to the West and Kisumu West Sub County to the South. There is a total population of 101,413 in the Sub County (County Government of Vihiga, 2014) with a doctor: patient ratio of 1:85,000 and nurse: patient ratio of 1:24,000. Located within the Sub County are nine public health facilities namely Vihiga County Referral Hospital, Vihiga Health Centre, Mbale Rural

Health Training Centre, Enzaro health centre, Lyanaginga health centre, Bugamangi dispensary, Mulele dispensary, Egago dispensary and Iduku dispensary. These facilities offer a wide range of preventive, curative and rehabilitative services. Infection prevention and control practices are essential in ensuring quality and safety of these services.

3.3 Study population

This research targeted health care workers providing services in the nine public health facilities in Vihiga Sub County. There were 300 health care workers in Vihiga Sub County (Vihiga County Government, 2014). Technical and non technical staff composed healthcare workers. Technical staff consisted of medical officers, clinical officers, nurses, pharmacy staff, laboratory technologists, nutritionists, public health officers and dental staff. These HCWs perform mainly curative, rehabilitative, health promotion and preventive services and have a basic training in health sciences. Non technical staff encompasses support staff and casual workers who mainly perform support and or administrative services. Most of health care workers are employees of Vihiga County government. However, some are contracted by nongovernmental organizations like *Aphia plus* while a few are employed by various facilities. Table 3.1 presents population of health care workers in public health facilities in Vihiga Sub County.

Table 3.1: Population of Health care workers in Public health facilities in Vihiga Sub County

Public health facility	No. of HCWs
Vihiga County Referral Hospital	184
Mbale Rural Health Training Centre	23
Vihiga Health Centre	20
Enzaro Health Centre	21
Lyanaginga Health Centre	24
Mulele dispensary	10
Egago dispensary	3
Bugamangi dispensary	7
Iduku dispensary	8
Total	**300**

3.3.2 Inclusion criteria

The following participants were included in this study:

1. Health care workers that were on duty at the time of data collection
2. Health care workers who had worked in a particular facility for at least two months, these HCWs may be more familiar with their working environment.
3. Health care workers who indicated their consent to participate in the study

3.3.3 Exclusion criteria

The following were excluded from the present research;

1. Students and interns

3.4 Research design

Cross Sectional study design was carried out in public health facilities in Vihiga Sub County between October and December 2015. This study design dictates that survey of exposure and outcome statuses are performed at a single point in time. For quick assessment of infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County, this design provided the most efficient and effective platform.

3.5 Sample size determination

When a population is more than 10,000 individuals, 384 of them are recommended as a desired sample size (Mugenda and Mugenda, 1999). The accessible population for this study was 300 health care workers and this was below 10,000 thus to obtain a representative sample size Mugenda and Mugenda (1999) recommends the following formula:-

$$\mathbf{nf} = \frac{n}{1+(\frac{n}{N})}$$

Where; **nf** = sample size required

N= Total population or estimated population

n = Desired sample size when population is more than 10,000.

$$\mathbf{n} = \frac{384}{1+(\frac{384}{300})}$$

n = <u>168</u>

To cater for non response during data collection, 10% of the sample size was added. Therefore, this study proposed a sample size (n) of 184. Nevertheless, a total of 173 health care workers eventually participated in the study.

3.6 Sampling procedure

Purposive sampling method was used to select the study area and five study sites namely Vihiga county referral hospital, Vihiga health centre, Enzaro health centre, Lyanaginga health centre and Mulele dispensary. These were largest or single public health facilities in each of the four wards in Vihiga Sub County. Mulele dispensary was selected among other dispensaries because it had the highest number of health care workers. Proportionate sampling was used to calculate the number of study participants to be interviewed in each of the selected health facilities. It was calculated as follows ($N \times n/n_1$) where N = Determined sample size (184), n = number of health care workers in each facility, and n_1= total number of health care workers in five selected facilities (259). For example, the sample size for Mulele dispensary was computed as follows; $184 \times 10/259 = 7$. Samples for each public health facility were therefore; Mulele =7, Vihiga health centre = 14, Lyanaginga health centre = 17, Vihiga County Referral hospital = 131 and Enzaro health centre = 15.

3.7 Recruitment process

The researcher identified entry points in to public health facilities as facility in charges that were sensitized on the importance of this research. The facility in charges and health care workers were then provided with information on eligibility criteria (sections 3.3.2 and 3.3.3). Health care workers who met inclusion criteria were recruited in to the study.

3.8 Research instruments

This study utilized three main data collection instruments to collect representative data from healthcare workers in five selected public health facilities. The instruments were questionnaires, observational checklists and Key Informant Interviews.

3.8.1 Questionnaires

The researcher developed questionnaires (Appendix I) comprising 33 closed ended questions to gather specific information from health care workers. The items covered four key issues; socio-demographic information of health care workers, how health system influence infection prevention and control practices, knowledge of basic components of infection prevention among health care workers and practice of important elements of infection prevention by health care workers. To allow participants answer the questions at their pleasure and to eliminate bias, questionnaires were self administered to respondents potentially involved in administering health services in public health facilities under study.

3.8.2 Observational checklist

The observational checklists (Appendix II) were derived and customized using the National Infection Prevention and Control Guidelines for Health Care Services in Kenya (2010). The observational checklists were used to gather additional data on availability of IPC resources and compliance with infection prevention and control standard precautions.

3.8.3 Key Informant Interviews

Key Informant Interviews were conducted by the researcher in order to gather more specific information on perceived barriers to compliance with infection prevention and control standard

precautions. Six Key Informants were identified and they included the Sub County Public Health Officer (SCPHO) who works in the office of Sub County Medical Officer of Health and one of his/her duties is to coordinate infection prevention and control services at Sub County level. Other Key Informants composed of five in charges of public health facilities under study because they administer all matters affecting their facilities including issues that concern infection prevention and control. Appointments with the Key Informants were made at least two weeks before the visit.

3.8.4 Reliability and validity

To ensure validity of data collection tools, the structured questionnaires and observational checklists were pretested in neighboring Sub County health facility. The main purpose of pretesting was to check on the content validity, language clarity and relevancy of information needed by the researcher. Supervisors' and peer comments on the research instruments were sought before final data collection from five public health facilities in Vihiga Sub County. Internal consistency among the questionnaire items was 0.90 Cronbach's alpha (α) and it was considered to be within the acceptable range.

3.9 Data Analysis

Data from questionnaires and observational checklists were stored in excel spreadsheet, after which they were imported into Statistical Package for the Social Science (SPSS) version 20 data base for statistical analysis. Standard descriptive statistics; frequency, percent, mean and median were calculated to demonstrate the demographics of research participants and characterize distribution of variables. Compliance with desired protective measures of infection prevention and control, the dependent variable, was measured by practice of important elements of infection

prevention and control i.e. hand hygiene, use personal protective equipment and biomedical waste segregation by health care workers.

For objective one, compliance with desired protective measures of infection prevention and control were examined for possible association with independent variables consisting factors in health care system. Pearson's chi square test was conducted to examine the association between compliant measures and independent variables. For objective two, a set of question were administered to healthcare workers to measure ideal and expected basic knowledge on IPC (namely healthcare associated infections, importance of IPC and important elements of IPC) against the actual knowledge of health workers. Level of knowledge of health care workers was measured by methods that relied on giving a correct answer to questions and whether they had read national guidelines. Chi square test was conducted to examine the association between compliant measures and independent variables. Secondly, overall healthcare workers' compliance with infection prevention and control standard precautions were defined as always adhering to desired protective measure. For each Likert item, the minimum score was zero (0) while the maximum score was three (3). Compliance level was rated as follows; less than 49% not compliant, 50-74% below recommended compliance standards, 75%-99% acceptable compliance, while 100% excellent compliance. In analysis of objective one and objective two, P-value ≤ 0.05 was considered significant. For objective three, thematic analysis was performed to establish barriers to compliance with infection prevention and control standard precautions.

3.10 Ethical consideration

This study commenced upon approval by Maseno University Ethics Review Committee (MUERC) and permission from the County director of health services, Vihiga County. The

heads of health facilities to be visited were contacted formally to permit the activities of this research in their facilities. This was minimum risk study and therefore, adverse events, social or personal risks were not anticipated. Those health care workers who met admission criteria were asked to provide an informed consent before they participated in the study. Every effort was made to protect participants' confidentiality. Participant's name did not appear on data collection tools but instead, every participant was assigned a unique code number making it difficult to link informed consent forms and data collection tools. Data was stored in tabular form in a spreadsheet with a password protection in a computer and external storage disk. Furthermore, participants were informed that participating in this study would not yield any direct benefits although findings of this study may benefit them indirectly.

3.11 Study limitations

One of the most important limitations of this study was that health care workers worked in different shifts hence it was difficult to find all of them at the same time. This would have negatively impacted the response rate. To counter this, the researcher visited every facility under study at least two times. Also, self administered questionnaires enabled the respondents to complete them at their own convenient time.

CHAPTER FOUR: RESULTS

4.1 Socio-demographic factors of healthcare workers in Vihiga Sub County

A total of 173 health care workers were interviewed and their information recorded. These participants were recruited from five public health facilities (study sites) namely Enzaro health centre, Vihiga health centre, Lyanaginga health centre, Mulele dispensary and Vihiga County Referral Hospital.

4.1.1 Gender of health care workers

Table 4.1 presents distribution of cadres of health care workers by gender. The results indicate that most health care workers 111(64.2%) were female while 62(35.8%) were male.

Table 4.1: Distribution of various cadres by gender (n=173)

Cadre	Gender		Total
	Female	Male	
Medical Officers	6	7	13
Clinical Officers	10	9	19
Nurses	58	20	78
Laboratory technologist	6	6	12
Nutritionists	3	1	4
Pharmacist or Pharm tech	5	3	8
Public health officers	2	3	5
Dental Officers	1	2	3
Support staff	5	4	9
Casuals	15	7	22
Total	**111**	**62**	**173**

4.1.2 Age of health care workers

Figure 4.1 shows age of health care workers. The results show that among 173 participants, majority 76 (43.9%) were aged between 21 and 30 years. 59 (34.1%) were aged between 31-40 years, 27 (15.6%) were aged between 41-50 years while 11 (6.4%) were aged over 50 years. The mean age for health workers in Vihiga Sub County was 32.9 years.

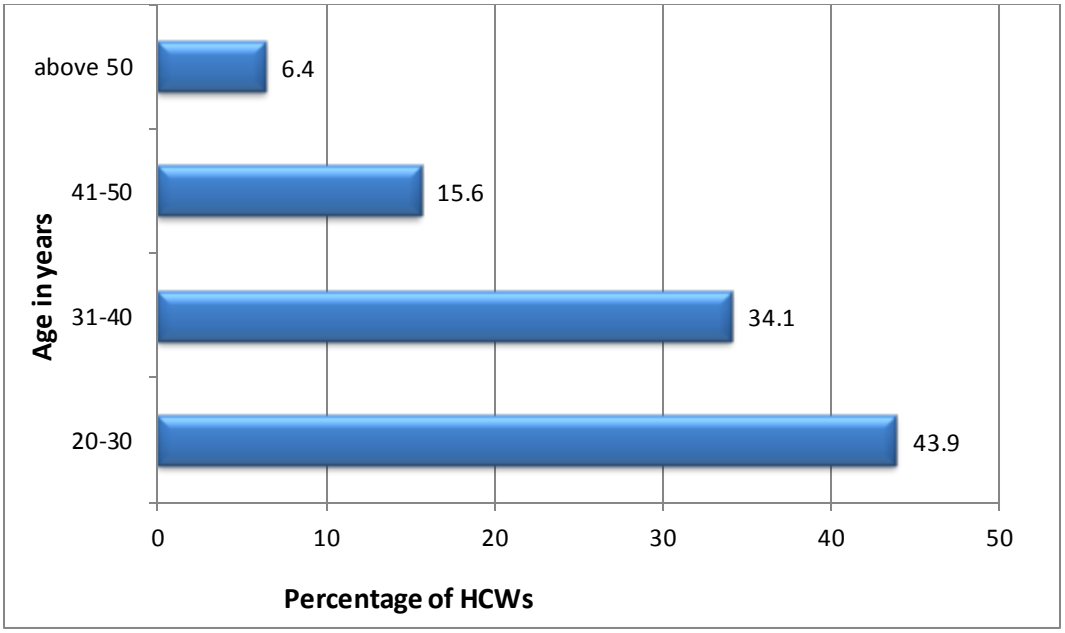

Figure 4.1: Age of health care workers

4.1.3 Education Level of health care workers

Figure 4.2 demonstrates educational levels of health care workers. The results indicate that most of health care workers 103 (59.5%) had a diploma level of education. The least of health workers, 3 (1.7%) had attained a post graduate level of education. 33 (19.1%) had a bachelors degree, 15 (8.7%) had a certificate, 14 (8.1%) had secondary school level of education while 5 (2.9%) had a primary school level of education.

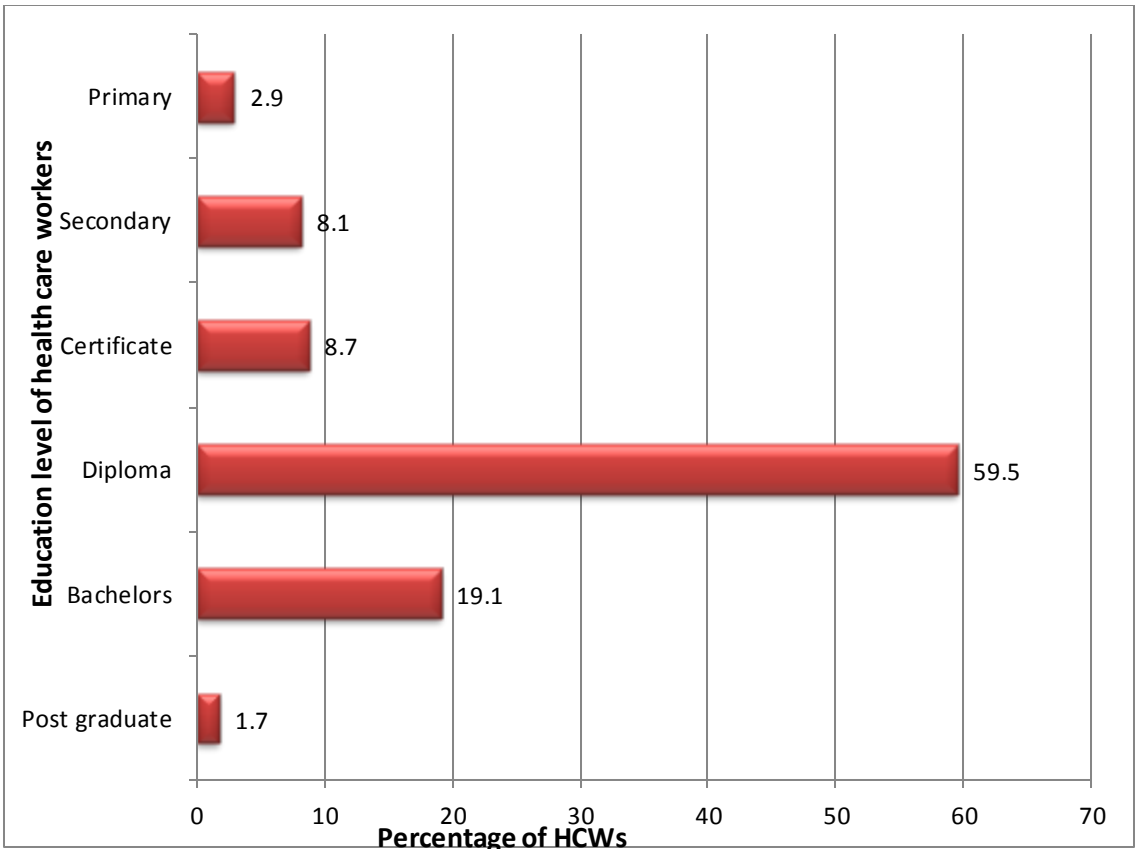

Figure 4.2: Education level of health care workers

4.1.4 Cadre of Health care workers

Figure 4.3 presents cadres of health care workers. The results show that most of health care workers 78 (45.1%) were nurses. Others include medical officers 13 (7.5%), clinical officers 19 (11%), pharmacy staff 8 (4.6%), nutritionists 4(2.3%), public health officers 5 (2.9%), casuals 22 (12.7%), dental staff 3 (1.7%), the support staff 9 (5.2%) and laboratory technologists 12 (6.9%).

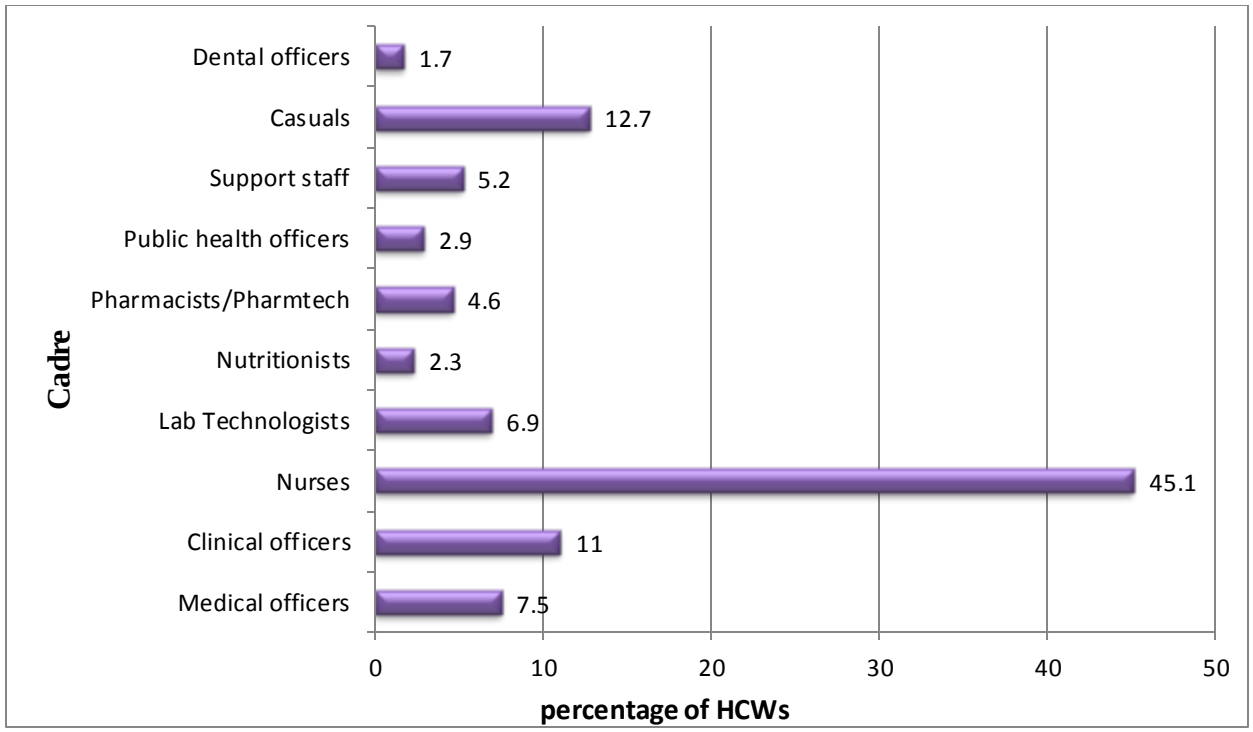

Figure 4.3: Cadre of Health care workers

4.1.5 Years in services of health care workers

The results of this study indicate that majority of health workers 81 (46.8%) in Vihiga Sub County had worked between 3-5 years at the time of interview. 44 (25.4%) had worked for over nine years, 29 (16.8%) had worked between 6-8 years while the least, 19 (11%) had worked for less than two years.

Table 4.2 presents socio-demographic characteristics of health care workers in public health facilities Vihiga Sub County, Kenya.

Table 4.2: Socio-demographic characteristics of health care workers in Vihiga Sub County (n=173)

Characteristics	Frequency	Percent (%)
Gender		
Female	111	64.2
Male	62	35.8
Age		
21-30	76	43.9
31-40	59	34.1
41-50	27	15.6
51-60	11	6.4
Education Level		
Post graduate	3	1.7
Bachelors	33	19.1
Diploma	103	59.5
Certificate	15	8.7
Secondary	14	8.1
Primary	5	2.9
Cadre		
Medical officers	13	7.5
Clinical officers	19	11
Nurses	78	45.1
Lab Technologists	12	6.9
Nutritionists	4	2.3
Pharmacists/Pharmtech	8	4.6
Public health officers	5	2.9
Support staff	9	5.2
Casuals	22	12.7
Dental officers	3	1.7
Years in service		
Less than 2 years	19	11
3-5 years	81	46.8
6-8 years	29	16.8
over 9 years	44	25.4

4.2 Factors in health care system that influence the practice of infection prevention

4.2.1 Work load for health care workers

Figure 4.4 presents work load of health care workers. The results indicate that majority of health care workers 93 (53.8%) attend to over thirty clients per day 31 (17.9%) attend to 11-20 clients in a day, 28 (16.2%) health workers attend to between 21 to 30 clients in a day while only 21 (12.1%) health care workers attend to between 1 to 10 clients in a day.

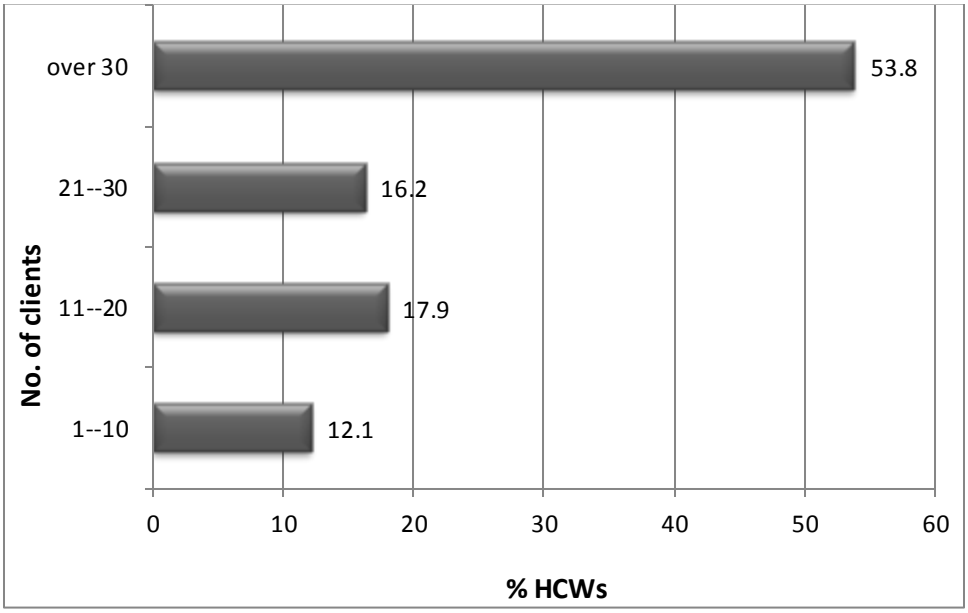

Figure 4.4: Workload for health care workers

4.2.2 IPC trainings, guidelines, laws and policies

Majority 126 (72.8%) of health care workers under study had had an infection prevention and control training at the time of interview while only 47 (37.2%) had not undergone any type of infection prevention and control training. Figure 4.5 demonstrates mode of IPC training for health care workers. The results show that among those who had undergone IPC training, most

of them 55 (43.7%) trained through seminars. 30 (23.8%) health care workers had undergone a formal (a training lasting for at least 10days consisting of learning, IPC reviews and formation of IPC plans) IPC training, 17 (13.5%) trained through on job training (OJT) while 24 (19%) trained through continuous medical education (CME).

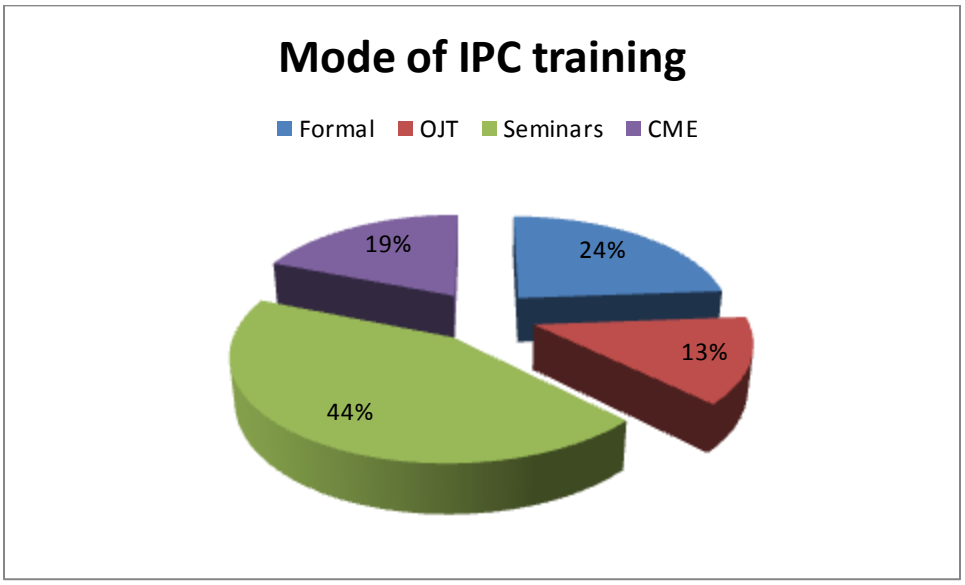

Figure 4.5: Mode of IPC training of health care workers

When asked if they had seen the national infection prevention and control guideline for health care services in Kenya, majority of health care workers, 102 (59%) agreed that they had seen it while 71 (41%) said they had not seen the national guidelines. On the contrary, most health care workers, 92 (53.2%) were not aware of any other laws concerning infection prevention and control. Nevertheless, most of healthcare workers 119 (68.8%) said that their health care facilities had a working infection prevention and control standard operating procedures, although observation revealed that only 20% of public health facilities under study had visible SOPs. Asked whether they knew of facility based infection prevention and control policy, majority of health care workers, 101(58.4%) said that their facilities did not have facility based IPC policies.

4.2.3 Infection prevention and control resources

Most health care workers 68 (39.3%) revealed that their respective administrations only occasionally provide necessary resources for infection prevention and control. 36 (20.8%) respondents said that their administration always provide necessary IPC resource, 64(37%) said necessary IPC resources are provided most of the time while 5 (2.9%) said the necessary IPC resources are never provided by their respective administration.

4.2.3.1 Human resources

As far as human resources are concerned, it was observed that all (100%) facilities under study in Vihiga Sub County have infection prevention and control focal persons. However, infection prevention and control persons in 4 facilities (80%) perform other duties. Furthermore, it was observed that only 20% of public health facilities in Vihiga Sub County have working infection prevention and control committee. However, during the time of visit it was observed that the only existing infection prevention and control committee had not held any committee meeting three months preceding the visit.

4.2.3.2 Personal protective equipment

It was observed that 100% of public health facilities under study had adequate availability of gloves. However, 80% of these facilities had gloves easily accessible to the staff. Nevertheless, it was noted that caps, aprons and gowns were adequately available in only 40% of health facilities under study. Most of health facilities (60%) did not have these resources. Furthermore, in the facilities with the caps, aprons and gowns, only 20% had them easily accessible to the staff.

Also, all facilities 5 (100%) under study did not have respirators (N-95) for their staff working in tuberculosis clinics.

4.2.3.3 Water supply and hand hygiene resources

It was observed that most 3 (60%) public health facilities under study had a tap and a sink with running water only in some procedure rooms. One facility (20%) did not have running water while one (20%) had taps and sinks with running water in all procedure rooms at the time of visit. Also, it was observed that 60% of facilities under study had disposable towels although the towels were only available in some rooms; 2(40%) facilities did not have disposable towels. Most of the public health facilities 80% had waterless antiseptic solutions in procedure rooms.

4.2.3.4 Health facility environment

It was observed that 4 (80%) health facilities under study had cross ventilation in their chest clinics while only one (20%) did not have cross ventilation. Also, all 5 (100%) health facilities had sanitary facilities for their staff and patients/clients for both gender. However, it was observed that only 2 (40%) public health facilities had surfaces which were smooth and easy to clean; 3 (60%) health facilities hand surfaces which were mostly cracked and non-impervious hence difficult to clean. It was also observed that all 5 (100%) facilities had lockable cupboards used to store equipment. Nevertheless, the cupboards were only available in some procedure rooms. On the same note, all 5 health facility did not have a policy on triaging patients based on infectious diseases. It was also observed that only one public health facility had an incinerator to burn hospital wastes. Table 4.3 presents IPC resources in five public health facilities under study.

Table 4.3: Infection prevention and control resources in five public health facilities in Vihiga Sub County

Resource	No. of Public health facilities	Percent (%)
Adequate availability of gloves		
Yes	5	100
No	0	0
Accessibility of glove by HCWs		
Yes	4	80
No	1	40
Availability of caps, aprons and gowns		
Yes	2	40
No	3	60
Use of prescribed masks in TB clinic		
Yes	0	0
No	5	100
Tap and sinks with running water		
Yes	1	20
No	1	20
Only in some rooms	3	60
Availability of disposable towels		
Yes	0	0
No	2	40
Only in some rooms	3	60
Availability of waterless antiseptic		
Yes	5	100
No	0	0
Availability of IPC Committee		
Yes	1	20
No	4	80

4.2.4 Relationship between health system factors and practice of infection prevention and control by health care workers

The results indicate that there was no significant association between workload for health care workers and compliance with hand hygiene (χ^2 = 2.637, d.f = 3, P value 0.451). Also, there was no significant association between workload for health care workers and compliance with putting on PPEs when performing invasive procedures to patients (χ^2 = 6.861, d.f = 3, P-value 0.076). The association between workload and compliance to biomedical waste segregation by healthcare workers was also not statistically significant (χ^2 = 3.334, d.f = 3, P-value 0.343)

The results indicate that association between being trained on IPC and compliance to hand hygiene by health care workers is not statistically significant (χ^2 = 0.371, d.f=1, P-value 0.542). The association between training on IPC and use of personal protective equipment by health care workers was not statistically significant (χ^2 = 0.061, d.f = 1, P-value 0.805). Also, there was no significant association between being trained on IPC and using color coded containers to segregate biomedical wastes (χ^2 = 2.147, d.f = 1, P-value 0.143).

The results for this study have revealed that there is a significant association between awareness of other laws concerning infection prevention and cleaning hands before and after attending to patients (χ^2 = 11.198, d.f = 3, P-value 0.011) with 41.9% of those respondents who were aware of other laws concerning IPC always cleaning their hands before and after attending to patients. On the contrary, only 23.9% of HCWs who are not aware of other laws concerning IPC always clean their hands before and after attending to patients. However, the association between HCWs' awareness of other laws and use of PPEs and use of color coded receptacles to segregate biomedical wastes was not statistically significant (P-value>0.05).

The results for this study indicate that there was significant association between provision of IPC resources by administration and putting on caps, masks, gowns and mackintosh by health care workers when performing invasive procedures to patients (χ^2 = 24.994, d.f = 9, P-value 0.003) with more than a half (52.9%) of HCWs who perceive that their administration always provide necessary IPC resources always putting on PPEs while performing invasive procedures to patients; 80% of respondents who feel that their administrations never provide necessary IPC resources relatively never put on the PPEs when performing procedures to patients. There was significant association between provision of IPC resources by the administration and cleaning hands before and after attending to patients (χ^2 = 29.89, d.f = 9, P-value <0.001) with nearly a half (47.2%) of health workers who feel that their administration always provide necessary resources always cleaning their hands before and after attending to patients; all respondents (100%) who feel that their administration never provide necessary IPC resources only occasionally clean their hands. Also, there was significant association between provision of infection prevention and control resources by administration and use of color coded receptacles to segregate biomedical wastes by health care workers (χ^2 = 37.127, d.f = 9, P-value <0.001). 80.5% of respondents who feel that their respective administration always provide necessary IPC resources always use color coded receptacles to segregate biomedical wastes; non of respondent who perceive that their administration never provide necessary resources always use the color coded receptacles to segregate biomedical wastes. Table 4.4 presents the relationship between health system factors and IPC practices.

Table 4.4: Relationship between health system factors and IPC practices

Relationship between health system factor and compliant measures	Chi square	P-value
Workload and compliance to hand hygiene	2.64	0.451
Workload and use of PPEs	6.861	0.076
Workload and biomedical waste segregation using colour coded receptacles	3.334	0.343
Training and compliance with hand hygiene	0.37	0.542
Training and use of PPEs	0.061	0.805
Training and biomedical waste segregation using colour coded receptacles	2.14	0.143
Awareness of other laws and compliance with hand hygiene	11.198	0.011
Provision of IPC resources by administration and use of PPEs	24.99	0.003
Provision of IPC resources by administration and cleaning hands before and after attending to patients	29.89	<0.001
Provision of IPC resources by administration and biomedical waste segregation using colour coded receptacles	37.127	<0.001

4.3 Knowledge and practice of infection prevention and control by health care workers

4.3.1 Knowledge of health care workers on infection prevention and control

4.3.1.1 Reading IPC guidelines

Results for this study indicate that majority 97 (56.1%) of health care workers have never read national infection prevention and control guidelines for health care services in Kenya while only 76 (43.9%) have read the national guideline. The results for this study indicate that those who have read the national guidelines include; majority (92.3%) of medical officers, 26.3% of clinical officers, 43.6% of nurses, 58.3% of laboratory technologists, 50% of nutritionists, 12.5% of

pharmacist or pharmaceutical technologists, 60% of public health officers, 55.6% of support staff, 27.3% of casual workers, and 33.3% of dental staff. Table 4.5 presents HCWs who have read the national IPC guidelines by cadre.

Table 4.5: HCWs who read the National IPC guidelines

Cadre of HCWs	Read National IPC guidelines		Total (n=173)
	Yes	No	
Medical officers	12(92.3%)	1(7.6%)	13
Clinical officers	5(26.3%)	14(73.7)	19
Nurses	34(43.6%)	44(56.4%)	78
Laboratory technologists	7(58.3%)	5(41.7%)	12
Nutritionists	2(50%)	2(50%)	4
Pharmacists/Pharm techs	1(12.5%)	7(86.5%)	8
Public health officers	3 (60%)	2(40%)	5
Support staff	5(55.5%)	4(44.5)	9
Casuals	6(27.2%)	16(72.8%)	22
Dental staff	1(33.3%)	2(66.7%)	3
Total	**76(43.9%)**	**97(56.1%)**	**173**

4.3.1.2 Knowledge of health care workers on the basic components of infection prevention and control

The results for this study show that most respondents 115 (66.5%) know that health care associated infections are acquired in hospital often after 48th hour of admission. 147 (85%) know that HAIs are acquired during provision of health care services and 161 (93.1%) know that the risk of infection is high if IPC is not observed. However, minority of respondents 44(25.4%) know that HAIs are not usually present during admission of patients.

As far as sources of health care associated infections are concerned, the results for this study indicate that most respondents 167 (96.5%) know that hospital (biomedical) wastes may be a

source of HAIs. 165 (95.4%) of respondents know that patients may be a source of HAI and 144(83.2%) respondents know that health workers may be a source of HAI.

The results for this study indicate that 172 (99.4%) respondents know that patients are risk of being infected with HAI, 164(94.8%) respondents know that health care workers are at risk of acquiring HAI, 150(86.7%) know that visitors in health facilities are at risk of infection and 133(76.9%) know that general public is at risk of acquiring health care associated infection.

Majority of respondents 158 (91.3%) know that health care associated infections may be transmitted through contact, 168 (97.1%) health care workers know that HAIs may be transmitted through contaminated medical instruments and 160 (92.5%) respondents know that HAIs may spread through contaminated laundry.

As far as importance of infection prevention and control is concerned, the results for this study have established that most respondents 163 (94.2%) know that IPC protect hospital visitors, 168 (97.1%) know that IPC protect HCWs and 165 (95.4%) know that practicing IPC protects patients from acquiring HAIs.

Majority of respondents 172 (99.4%) that hand hygiene is an important element of IPC, 170 (98.3%) know that personal protective equipment is another IPC element and 168 (97.1%) know that biomedical waste management is yet another element of IPC. However, very few 22 (12.7%) know that IPC committee is not an element of IPC. The results indicate that averagely, 84.7% (80-100%) of questions were responded to correctly. This demonstrated that health care workers may have sufficient knowledge on basic components of infection prevention and control. Table 4.5 presents health care workers' knowledge on basic components of IPC.

Table 4.6: Health care workers knowledge on IPC (n=173)

IPC CONCEPT	KNOW		DON'T KNOW	
	Frequency	Percent (%)	Frequency	Percent (%)
HAI				
HAI acquired in hospitals	115	66.5	58	33.5
Occur during provision of healthcare services	147	85	26	15
High risk if basic IPC are not observed	161	93.1	12	6.9
Present at the time of health care delivery	44	25.4	129	74.6
Sources of HAI				
Hospital waste	167	96.5	6	3.5
Patients/clients	165	95.4	8	4.6
Healthcare workers	144	83.2	29	16.8
Population at risk				
Patients	172	99.4	1	0.6
Healthcare staff	164	94.8	9	5.2
Hospital Visitors	150	86.7	23	13.4
General public	133	76.9	40	23.1
Transmission of HAI				
Through contact	158	91.3	15	8.7
Through contaminated surgical instruments and other equipment	168	97.1	5	2.9
Through contaminated laundry	160	92.5	13	7.5
Importance of IPC				
Protect hospital clients from healthcare acquired infections	163	94.2	10	5.8
Protect healthcare workers from healthcare acquired infections,	168	97.1	5	2.9
Protect patients from healthcare acquired infections	165	95.4	8	4.6
Elements of IPC				
Hand hygiene	172	99.4	1	0.6
Personal protective equipments	170	98.3	3	1.7
Hospital waste management,	168	97.1	5	2.9
Infection prevention and control committee	22	12.7	151	87.3

4.3.1.3 Relationship between HCWs' IPC knowledge and infection prevention and control practices

The results for this study have established that there was significant association between reading national guidelines and the use of caps, aprons, scrub suits and mackintosh (χ^2 = 7.619, d.f =3, P-value 0.05) with more than a third (39.4%) of those who have read the national guidelines always putting on PPEs when attending to patients. Only 23% of those who have not read the national guidelines always put on PPEs when attending to patients. There is significant association between reading the national guidelines and putting on respirators when handling patients suspected or confirmed with air borne diseases including tuberculosis (χ^2 = 14.532, d.f = 3, P-value 0.002); 55.6% of those who have never read the national guidelines never put on respirators when handling patients suspected or confirmed with air borne diseases . There is significant association between reading the national guidelines and cleaning hands before and after attending to patients (χ^2 = 14.05, d.f = 3, P-value 0.003) with 40.8% of those HCWs who have read the national guidelines always cleaning hands before and after attending to patients; only a quarter (25%) of HCWs who have never read the national guidelines always clean their hands before and after attending to patients. The results for this study show that there was significant association between reading the national guidelines and cleaning hands before and after putting on gloves (χ^2 = 12.77, d.f = 3, P-value 0.005) with more than a third (34.2%) of respondents who have read national guidelines always cleaning their hands before and after putting on gloves; a third of respondents who have read the national guidelines clean their hands only sometimes before and after putting on gloves. However, the association between reading national guidelines and use of color coded receptacles for segregation of biomedical wastes was not statistically significant (χ^2 = 5.8, d.f = 3, P-value 0.122).

The results have indicated that there was no significant association between Health care workers' knowledge of components of HAI, importance of IPC and important elements of HAI and adherence to infection prevention and control desired protective measures (P-values >0.05). Table 4.7 below presents the relationship between health care workers' knowledge and IPC practices.

Table 4.7: Relationship between health care workers' knowledge and IPC practices

Relationship between health care workers' knowledge and IPC practices	**Chi square**	**P-Value**
Reading national guidelines and use of PPEs	7.619	0.05
Reading national guidelines and use of respirators	14.532	0.002
Reading national guidelines and cleaning hands before and after attending to patients	14.05	0.003
Reading national guidelines and biomedical waste segregation using colour coded receptacles	5.8	0.122
Knowledge of basic components of IPC and compliance with IPC standard precautions		>0.05

4.3.2 Practice of infection prevention and control by health care workers

4.3.2.1 Practice of hand hygiene

Results of this study have indicated that majority of health care workers 108 (62.8%) use running water with soap to clean their hands. 50 (28.9%) health workers reported that they used both running water with soap and alcohol hand rub (sanitizer), 9(5.2%) respondents reported that they used alcohol hand rub alone, 4 (2.3%) reported that they used water alone, while 2 (1.2%) reported that they didn't know what they used to clean their hands with.

When asked whether they clean their hands before and after attending to every client, 57 respondents (32.9%) who were majority reported that they only wash their hands occasionally before and/or after attending to their patients. 56 (32.4%) respondents clean their hands most of the time before and after attending to clients, 52 (30.9%) reported that they always cleaned hands while only six (3.5%) reported that they never cleaned their hands before and after attending to clients. Proportionally, dental officers had the best hand hygiene practices (100%) followed by support staff (55.5%), medical officers (46.2%), casuals (40.9%), laboratory technologists (33.3%), Nurses (29.5%), pharmacists/pharmaceutical technologists tallied with nutritionists at (25%), clinical officers (15.8%) while public health officers (0) (this may be due to the fact that PHOs seldom handle patients or specimens directly). Table 4.6 demonstrates hand hygiene habits before and after attending to patients and clients among various cadres of health care workers.

Table 4.8: Cleaning hands before and after attending to patients by cadre

Cadre	**Cleaning hands before and after attending to patients**				**Total (n=173)**
	Always	**Most of the time**	**Sometimes**	**Never**	
Medical officers	6	6	1	0	**13**
Clinical officers	3	5	11	0	**19**
Nurses	23	29	25	1	**78**
Laboratory tech	4	4	4	0	**12**
Nutritionists	1	2	0	1	**4**
Pharmacist/pharm tech	2	1	1	4	**8**
Public health officers	0	3	2	0	**5**
Support staffs	5	0	4	0	**9**
Casuals	9	4	9	0	**22**
Dental officers	3	0	0	0	**3**
Total (n=173)	**56**	**54**	**57**	**6**	**173**

Asked whether they clean their hands before and after putting on gloves, 58 (33.5%) respondents reported that they always cleaned their hands before and after putting on gloves. 52 (24.3%) respondents said they did it most of the time, 47 (27.2%) said they only cleaned occasionally while 16 (9.2%) said they never cleaned their hands. When asked which factors deter them from cleaning hands before and after attending to patients, health workers who occasionally cleaned and those who never cleaned their hands cited; no need (5.6%), lacked hand hygiene facilities (73.3%), too busy to clean (18.9%) while two (2.2%) gave other reasons. It was also observed that most public health facilities hand tabs and sinks with running water only in some rooms. However, it is worth noting that 100% of public health facilities had waterless antiseptics which would supplement running water in situations where health care workers' hands were not soiled.

Table 4.9: Hand hygiene practices among health care workers (n=173)

Hand hygiene	Frequency	Percent (%)
Cleaning hands before/after attending to patients		
Always	56	32.4
Most of the time	54	31.2
Sometimes	57	32.9
Never	6	3.5
Cleaning hands before/after putting on gloves		
Always	58	33.5
Most of the time	52	30.1
Sometimes	47	27.2
Never	16	9.2
Cleaning hands after touching contaminated objects		
Always	118	68.2
Most of the time	36	20.8
Sometimes	19	11
Never	0	0
Cleaning hands before preparing medication for patients		
Always	72	41.6
Most of the time	44	25.4
Sometimes	49	28.3
Never	8	4.6

4.3.2.2 Use of personal protective equipment

The results for this study indicate that 89 (51.5%) respondents who were majority confirmed that they always put on gloves when attending to patients; 42 (24.3%) reported that they put on gloves most of the time when attending to patients, 35 (20.2%) reported to put on gloves only some times while 7 (4%) reported that they never put on gloves when attending to their patients. Those health workers who occasionally put on gloves and those who never put on were asked to give reasons. Majority of them, 28 (62.2%) reported that the gloves were not available, 8

(17.8%) reported that they were too busy to put on gloves, 4 (8.9%) state that they experienced unpleasant reactions when they put on gloves while 5 (11.1%) reported that they do not directly attend to patients.

When asked if they use gowns, caps, scrub suits or aprons (PPEs) when performing invasive procedures to patients; Most 53 (30.6%) respondents confirmed that they always put on these protective equipment, 30 (17.3%) said they put on these equipment most of the time, 51 (29.5%) said they only put on the PPEs sometimes while 39 (22.5%) reported that they never put on the PPEs. Among health care workers who never put on the PPEs or put them on sometimes while attending to patients, majority 76 (84.4%) cited unavailability of PPEs, 1 (1.1%) reported that there was no need while 13 (14.5%) cited time constraints as the reason why they were not able to effectively put on the PPEs.

When asked if they put on prescribed masks (N95 respirators) while handling patients with suspected or confirmed airborne infection including tuberculosis, most 75 (43.3%), respondents reported that they never put on the masks. 45 (26%) respondents reported that they put the respirators only sometimes, 37 (21.4%) reported that they always put on the masks while 16 (9.2%) reported that they put on the respirators most of the time they handle patients who are suspected or confirmed to suffer from airborne infections.

4.3.2.3 Biomedical waste management

The results for this study indicate that most of respondents 127 (73.4%) always use color coded separate receptacles to segregate their wastes. 20 (11.6%) respondents use the receptacles most of the time, 20 (11.6%) respondents use these receptacles sometimes while 6 (3.4%) never use the colour coded receptacles to segregate biomedical wastes. It was observed that all public

health facilities under study had biomedical waste containers. Furthermore, 4 (80%) public health facilities under study used colour coded containers for waste segregation. However, it was observed that in most 3 (60%) public health facilities the receptacles were only available in some rooms. 2 (40%) health facilities had these containers in all the procedure rooms and 80% (4) of the facilities had the receptacles with color coded polythene linings.

It was observed that all facilities (100%) had puncture proof, leakage proof and temper proof containers where sharps are stored. Also, handlers of the sharps put on heavy duty gloves. However, it was observed that 3 (60%) health facilities had waste receptacles overfilled at the time of visit. Also, at the time of visit at was observed that 3 (60%) public health facilities store sharps containers and then transport them to the County referral hospital for incineration, 1 (20%) health facility practiced open burning while 1 (20%) incinerated sharps in double chamber incinerator.

It was observed that 3 (60%) health facilities neutralize their liquid wastes before discharging it to the sewer while 2 (40%) discharged their liquid wastes to sewer without neutralization. Hazardous wastes are transported in most of health facilities (60%) to the County referral hospital where they are incinerated. Furthermore, 100% of health facilities under study dispose pathological wastes by dropping them in placenta pits.

4.3.2.4 Management of medical equipment

It was observed that all facilities under study, 5 (100%) follow the recommended order of processing medical equipment i.e. decontamination in chlorine, cleaning with soap and water, rinsing with clean water, high disinfection or sterilization then storage of the equipment. It was however observed that only 1 (20%) health facility makes 0.5% chlorine in procedure rooms

after every eight hours while 4 (80%) health facilities under study makes another 0.5% chlorine after the existing one is visibly dirty.

4.3.2.5 Health facility environment environmental sanitation

It was observed that most public health facilities 4 (80%) under study are cleaned once every day and only 1 (20%) health facility is cleaned twice every day. Key Informants confirmed this but added that segments of their facilities may be cleaned any other time need arises for instance when it is contaminated. At the time of visit it was observed that surfaces in all public health facilities (100%) were not visibly dirty. Also, all facilities (100%) had wet mopping as the preferred method used to clean floor while flooding with frictional cleaning was used to clean surgical floors especially in maternity, minor theatre and the major theatre.

4.3.2.6 Health care workers compliance to infection prevention standard precautions

Figure 4.6 presents IPC compliance levels among health care workers. The results indicate that: average compliance with hand washing before and after attending to patients was 65.9%, cleaning hands before and after putting on gloves was 63.7%, cleaning hands after touching contaminated objects was 85.7%, cleaning hands before preparing medication for patients was 68%, putting on gloves when attending to patients was 75%, putting on scrub suits, gowns, caps when performing procedures to patients was 52%, putting on respirators when attending to patients with confirmed or suspected airborne disease 32.2% and use of color coded containers to segregate wastes was 84.9%. It is noteworthy that compliance rates varied among the eight items from acceptable compliance for certain activities (e.g. cleaning hands after contact with contaminated object and using colour coded containers to segregate wastes) to non compliance

for others (e.g. putting on respirators when handling patients suspected or confirmed with air bone infections) . Median compliance among the eight items was 66.95%.

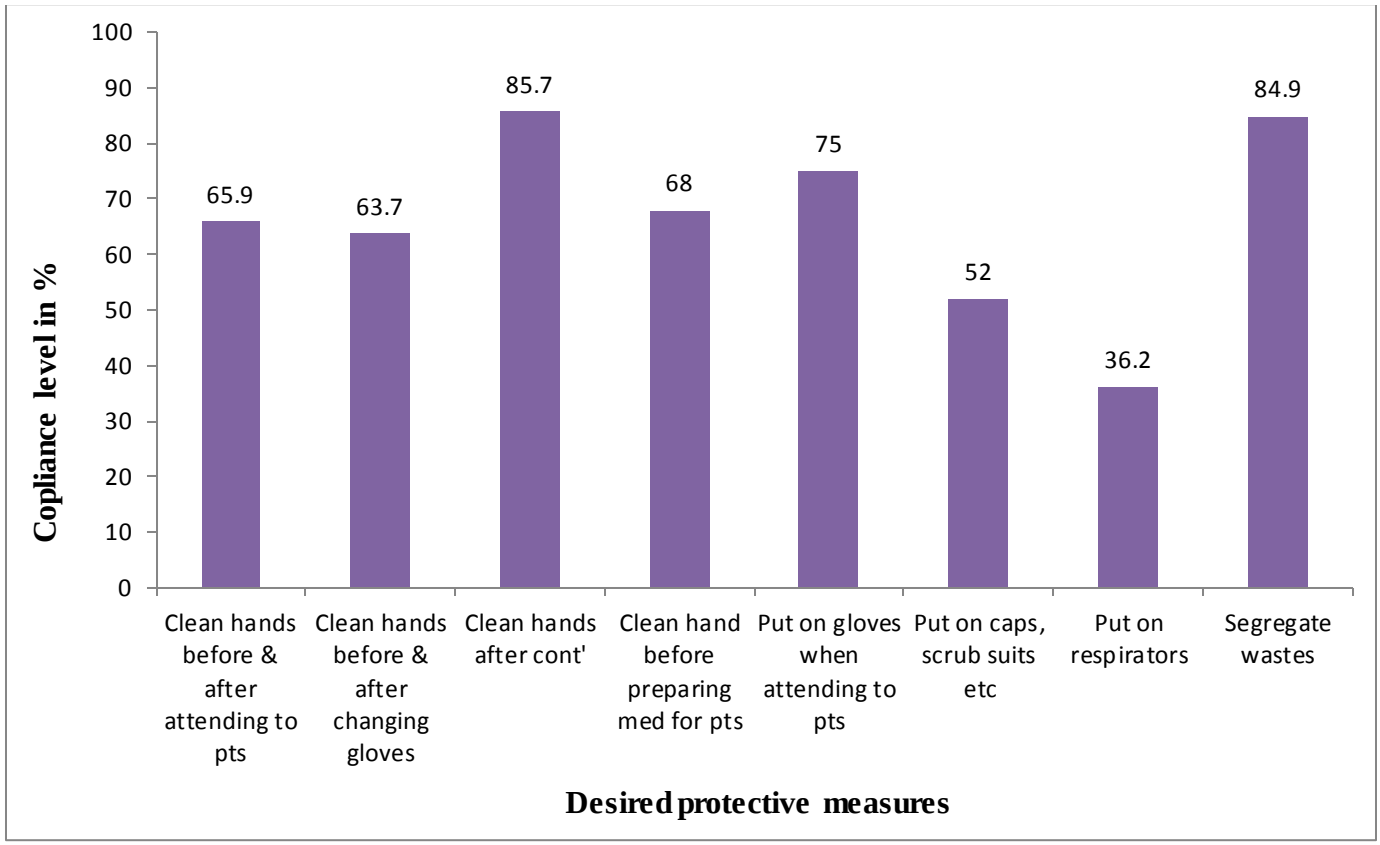

Figure 4.6: Health care workers compliance to IPC standard precautions

Key; pts means 'patients', cont' means when 'contaminated', put on respirators means 'putting on respirators when attending to patients with suspected or confirmed air borne disease-in this case tuberculosis'.

4.4 Barriers to compliance with infection prevention and control standard precautions

Described in this subsection are the themes identified in the Key Informants' discussions of the factors that may hinder healthcare workers' ability to comply with the recommended infection prevention and control practices.

4.4.1 Lack of resources

4.4.1.1 Insufficient water supply

Insufficient water supply emerged as a major issue among all the Key Informants. They said this forces health care workers to practice improper infection prevention and control procedures. The Key Informants reiterated that water supply is frequently halted hence staff in various facilities find it very difficult to cope with the situation. This makes health staff to resort to unhygienic practices which may pose risks to the patients and themselves.

'Water supply in our health facility is very unstable, cleaning the facility and hand hygiene practices are not done in the most appropriate manner'.

It is noteworthy that without sufficient amounts of water, hygiene and sanitary practices cannot be met.

4.4.1.2 Insufficient personal protective equipment

Lack of or insufficient personal protective equipment also emerged as one of critical barriers to compliance with infection prevention and control from all Key Informants. The most insufficient PPEs, they said, include; caps, N95 respirators, scrub suits, boots, mackintoshes, dust coats among others. The Key Informants confirmed that health care workers seldom put on personal

protective equipment especially in minor theatres because personal protective equipment were not available.

4.4.1.3 Insufficient waste management equipment

Key Informants stated that most of their facilities lack essential biomedical waste management facilities like incinerators and color coded waste receptacles.

'The available incinerators broke down sometimes back. This puts all of us at risk when storing and transporting highly infectious wastes to the County Referral Hospital'.

It is noteworthy that hospitals generate highly hazardous wastes and any leakage in the chain of management puts health care workers, visitors, patients and the general public at risk.

4.4.2 Negative staff attitude on infection prevention and control practice

Negative attitude on infection prevention and control emerged as a very important issue from most of the Key Informants. It emerged that some health care workers most often may understand the importance of practicing infection prevention and control or simply disregard infection prevention and control practices.

'*They (HCWs) just choose not to practice infection prevention. You will just see a staff working with only one pair of gloves on many patients and touching everything with the gloves.'*

It is important to note that many health care associated infections are transmitted through cross infection.

4.4.3 Staff shortage and work overload

Staff shortage and work overload are among critical issues that came out clearly from all the Key Informants. This is one of key barriers to compliance with infection prevention and control

standard precautions. It emerged from the Key Informants that many health care workers are facing time constraints and work over load while on duty and since infection prevention resources are only scantly available in some rooms the staff don't have enough time to use them.

'you may not run from outpatient to maternity ward which is a distance away to wash your hands while many patients are waiting on long queues, you better serve them.'

4.4.4 Lack of training

Lack of training emerged as a critical barrier from all the Key Informants. For them, training provides healthcare workers with skills and knowledge to do their jobs concerning infection prevention and control. The Key Informants said that formal trainings are not regularly offered to health care workers and most of them depend on the basic training they acquired while at training colleges which according to them is insufficient. Although some get training opportunities through on job trainings, seminars and continuous medical educations, the Key Informants believed that this offers very scanty information on IPC to health care workers.

'I don't remember the last time a staff in this facility was trained on infection prevention and control, no updates have been availed, thus it is so difficult to catch up with new things..'

4.4.5 Enforcement of infection prevention and control standards

The majority of the Key Informants indicated infrequent or seldom visitation from the County and/or Sub County Health Management teams especially towards infection prevention and control. None of Key Informants reported any visitation concerning infection prevention in the previous one year. Some of the Key Informants believed that this type of supervision is very helpful.

CHAPTER FIVE: DISCUSSION

5.1Introduction

This chapter discusses the findings of the present study. Section two (5.2) provides a discussion on the extent to which health care system influences the practice of infection prevention and control. The third section (5.3) discusses findings on the knowledge and practice of infection prevention and control by health care workers in Vihiga Sub County. And finally, the last section (5.4) discusses findings on barriers to compliance with infection prevention and control standard precautions.

5.2 How health care system influences practice of infection prevention and control

5.2.1 Infection prevention and control guidelines, laws and policies and trainings.

Infection prevention and control laws are intended to secure good practice. Awareness of these laws among health care workers is critical to achieve this. A study done in Northern Nigeria by Amoran and Amwuve, (2013) indicated that large proportion of health care workers were not aware of infection prevention and control laws, guidelines and policies. This study has established similar results indicating that most of health care workers (53.2%) were not aware of other laws concerning infection prevention and control. The present study has also indicated that there is a significant association between awareness of other infection prevention laws and cleaning hands before and after attending to patients; this finding concurs with (WHO, 2009) which showed that awareness of guidelines and laws by health care workers often improves compliance with infection prevention standard precautions.

A program consisting of focused training and frequent feedback can produce a sustained improvement in compliance with IPC standard precautions thus reducing the incidence of health care associated infections. Findings from this study indicate that most health care workers have received an IPC training through at least one of the following modes; formal training, on job training, continuous medical education or seminars. These results are similar to a study conducted in two referral hospitals in Kenya by Njagi, *et al.,* (2012) which indicated that healthcare professionals mainly acquire infection prevention and control trainings through the on-job training, seminars and informally through organized talks at work places. The findings of present study indicate that compliance with infection prevention and control standard precautions is not dependent on infection prevention and control trainings. This agrees with previous studies (Resenthal, *et al.,* 2005 and Ogoina *et al.,* 2015) which showed that more structured trainings provide a better understanding among trainees and without feedbacks IPC education may not produce a desired compliance with desired infection prevention protective measures. A study conducted by Suchitra and Lakshmi, (2007) established that IPC practices among health care workers declined after a certain duration of training. Therefore, more frequent trainings and feedbacks may help maintain compliance levels among health care workers.

5.2.2 Infection prevention and control resources

Based on observations, this study has indicated that public health facilities in Vihiga Sub County are deficient of important infection prevention and control recources. Among the most deficient resources are personal protective equipment, water supply, hand hygiene facilities and biomedical waste disposal facilities. Studies done elsewhere in Kenya (Opondo, *et al.,* 2009 and Gichuhi, *et al.,* 2015) similarly indicated that health care facilities lack basic infection prevention and control resources. These concur with findings in a study describing the burden of endemic

healthcare associated infections in developing countries (Allegranzi, *et al.,* 2011) which concluded that despite the need for more resources for effective infection prevention and control, these resources have decreased. Quality of health care service depends on the availability of infection prevention and control equipment and facilities (WHO, 2002). Based on the results of this study, the propability of contamination and cross infection in public health facilities in Vihiga Sub County is likely to be high thus there is need for better improvement.

It has been established from the results of this study that despite the fact that health care facilities have infection prevention and control focal persons, these persons also perform other duties. A previous study (WHO, 2008) similarly indicated that IPC focal persons often perform other duties in health care setting. Due to this, IPC focal persons may not have sufficient time to perform IPC duties. Majority of facilities do not have a working infection prevention and control committees and where available, the committees are domand. This finding is consistent with a previous study (Gichuhi, *et al.,* 2015) which showed that infection prevention and control committees in health facilities were ineffective. This may negatively influence coordination of infection prevention and control activities in public health facilities may be difficult.

The results of this study established a significant association between the provision of infection prevention and control by administration and hand hygiene practices, between provision of IPC resources by administration and use of PPEs including gloves, respirators, gowns, caps and mackintosh and between provision of IPC resources by administration and segragation of biomedical wastes using colour coded receptacles. This indicates that IPC practices are dependent on provision of IPC resources by the administration. These findings are synonimous with other studies by (Pittet, 2000; Dettenkofer *et al.,* 2004 and WHO, 2008) which indicated that if basic IPC resources such as personal protective equipment, hand hygiene and waste

management facilities are provided, some improvement in practice of infection prevention and control may be seen. Multimodal and multidisciplinary strategies are therefore necessary to improve compliance with infection prevention and control standard precautions because according to (Pittet, 2000), solo infection prevention and control interventions often fail.

5.2.3 Environmental sanitation in public health facilities

Based on observations, majority (80%) of public health facilities in Vihiga Sub County had cross ventilation in their tuberculosis clinics. A study by Michelle, *et al.,* (1992), indicated that natural cross ventilation plays a key role in providing fresh air which neutralizes micro-organisms responsible for airborne infections. In addition to other measures this is likely to minimize the risks of air borne transmission of infections including tuberculosis in these facilities.

A clean hospital environment plays an important role in the prevention and control of health care associated infections (MOMS and MOPHS, 2010). The present study has indicated that most (60%) health facilities had surfaces which were cracked and non-impervious thus making them difficult to clean. Studies in other parts of Kenya (Opondo, *et al.,* 2009; Gichuhi, *et al.,* 2015) similarly established that health facilities were often unable to maintain a safe hygienic environment for patients and healthcare workers. This may facilitate thriving and transmission of micro-organisms associated with healthcare associated infections in health care facilities.

5.3 Knowledge and practice of infection prevention and control by health care workers

5.3.1 Knowledge of health care workers towards infection prevention and control

The National infection prevention and control guidelines for healthcare services in Kenya provide wide range of IPC information to target readers. Reading these guidelines may provide

sufficient knowledge to HCWs which is necessary to improve infection prevention and control practices. This study has established that despite the fact that majority (59%) of healthcare workers have seen the national guidelines, most (56.1%) of them have never read the national guidelines. This is contrary to (WHO, 2009), which indicated that availability of guidelines, enhances awareness of these guidelines. Awareness of IPC guidelines significantly improves compliance with infection prevention and control standard precautions a practice that is crucial in reducing the incidence of health care associated infections (WHO, 2009). The present study has established a significant association between reading IPC guidelines and use of PPEs by health care worker and between reading IPC guidelines and hand hygiene practices by health care workers. This indicates that hand hygiene practices and use of PPEs among health care workers are dependent on reading infection prevention and control guidelines. This is a new finding since it is noteworthy that previous studies did not quantitavely establish relationship between reading national guidelines and IPC practices among HCWs, a weakness that has been addressed by the present study.

The findings of the present study have shown that, averagely 84.7% of IPC questions were answered correctly. This suggests that the health care had sufficient knowledge on basic components of infection prevention and control. However, there was no significant association between giving correct answers to IPC questions and adherence to infection prevention and control desired protective measures. A study conducted by (Fashafsheh *et al.,* 2015) to establish knowledge and practice of nursing staff toward IPC in Palestinian hospitals similarly indicated that despite the fact that nurses had fair knowledge, they had good practice. These findings were also concordant with another cross-sectional study (Gizaw *et al.,* 2015) carried out to assess knowledge and practice of health workers towards tuberculosis infection control and associated

factors in public health facilities of Addis Ababa which revealed that knowledge was not significantly associated with practice. The disparity between knowledge and practice may be due to inability for health care workers to change behavior which remains a formidable obstacle in prevention of healthcare associated infections (Burke, 2003).

5.3.2 The practice of infection prevention by health care workers

5.3.2.1 Hand hygiene

It is recommended (WHO, 2009) that alcohol-based hand rubs are the best for hand hygiene in a health care setting because it eliminates disease causing microorganisms, plain soap and water is good in reducing bacterial count but does not eliminate microorganisms. The results of this study indicate that most health care workers in public health facilities in Vihiga Sub County use running water with soap to clean their hands.

Hand hygiene significantly reduces the number of disease-causing microorganisms on hands and arms and can minimize cross-contamination. The present study has shown that only about a third (32.9%) of health care workers always clean their hands before and after attending to clients. This finding is consistent with a study by Mani *et al.,* (2010) which indicated that compliance level of hand hygiene among healthcare workers is below 50% in health care settings. This may enhance cross contamination and transmission of pathogenic microorganisms among patients. The results for present study indicated that the main reason for poor hand hygiene practice is insufficient water supply. A study by Quoc (2004) similarly indicated that lack of water supply in health care facilities contributed to contamination of hands which facilitate cross infection. There is thus need to improve water supply in health care facilities.

It has been established from the results of this study that higher proportions of non technical staff (45.2%) always clean their hands before and after attending to patients than technical staff (29.6%). A study performed by (Gichuhi, *et al.,* 2015) to establish IPC adherence levels among health care workers in level four hospitals in Kenya similarly indicated that hand hygiene was practiced better by support staff than technical health care workers. It was suggested by (Sachitra and Lakshmi, 2007) that this may due to the fact that non technical staff are most often under direct supervision. This raises a serious concern since technical health care workers handle patients more often than non technical staff hence poor practices may increase risks of health care associated infections among patients.

5.3.2.2 Use of personal protective equipment

If used consistently, by health care workers, personal protective equipment may provide effective barrier between health care associated infections and healthcare workers, patients and clients (WHO, 2002). It has been established from this study that use of personal protective equipment is below expected threshold. For instance slightly more than a half (51.4%) of health care workers always put on gloves while attending to patients. Also, based on observations it was noted that gowns, scrub suits or aprons were put on by health care workers attending to patients in maternity and main theatre. This is contrary to the fact that exposure to contaminants is similar in other procedure rooms. These findings are consistent with findings from previous studies (Allegranzi *et al.,* 2010: Amoran and Amwuve, 2013 and Ogoina *et al.,* 2015) which showed that PPEs were underutilized. Furthermore, use of N95 respirators by health care working when handling patient suspected or confirmed to be suffering from airborne infections including tuberculosis was very poor (9.2%). Low utilization of respirators may help explain why median prevalence of latent tuberculosis infection is high (63%) among health care workers in

developing countries including Kenya compared to latent Tuberculosis infection rate in high income countries of 24% as revealed by (Menziez *et al.*, 2007).

5.3.2.3 Management of biomedical wastes

Collection, segregation and safe disposal of biomedical wastes is very important because wastes produced during healthcare services delivery carry a higher potential for infections and injury than any other type of waste. These wastes are a source of avoidable infections, and are synonymous with public perception of poor standards of healthcare services (WHO, 2002). This study has established that although waste receptacles were overfilled in 60% of public health facilities, majority (73.4%) of health care workers use separate color coded containers to segregate hospital wastes. This finding tallies with a study (Patil and Pokhrel, 2005) which indicated that segregation of wastes is done in acceptable manner.

It was however, established from the finding of this study that only 20% of health facilities incinerated sharps in double chamber incinerator while 60% of health facilities transport wastes to be incinerated elsewhere because they lack incineration facilities. A study by the ministry of health of health (MOH, 2007) similarly indicated that incineration facilities in health care facilities in Kenya are limited and where available, they are either broken down or improperly used. Transportation of biomedical wastes to other facilities may increase the risk to healthcare workers and general public hence there is need for improvement.

5.3.2.4 Management of medical equipment

Based on observations, the findings of present study indicates that all five health care facilities follow recommended order of processing medical equipment thus this may help minimize

transmission of infections through medical equipment, this finding is similar to a study by (Rutula and Weber, 2004). According to their study, adherence to the recommended technique in processing medical equipment improve disinfection and sterilization practices in health care facilities, thereby reducing infections associated with contaminated patient-care items. However, it was observed that chemicals (0.5% chlorine) used for decontamination were not replaced as often are required hence this may undermine decontamination process.

5.3.2.5 Compliance with infection prevention and control standard precautions

Although this study has established that compliance levels vary across elements of infection prevention and control, median compliance with infection prevention and control desired protective measures was below recommended level of ≤75% (66.95%). A study by Mani, *et al.*, (2010) similarly showed that IPC compliance level among health care workers in health facilities was below expected threshold. To sufficiently prevent and control health care associated infections, there is need for better improvement.

5.4 Barriers to compliance with infection prevention and control standard precautions

Barriers to compliance with infection prevention and control standard precautions by health care workers were investigated through Key Informant Interviews. The Key Informants in this study identified a number of factors that hindered ability of health care workers to comply with infection prevention and control standards such as; lack of resources e.g. water supply, person protective equipment and waste management equipment; negative staff attitude, staff shortage and work overload, lack of training and lack of supervision and enforcement. Previous studies done elsewhere in Kenya and in other developing countries (Mani *et al.*, 2010, Dettenkofer *et al.*, 2004 and Omuga, 2011) likewise indicate that health care workers face barriers such as negative

attitute among healthcare workers and staff burn out, understaffing, overcrowding in health facilities, poor access to hand washing facilities and irritant contact dermatitis associated with frequent exposure to soap and water.

From these findings, health workers improved compliance with infection prevention and control standards can be achieved through availing IPC resources, enhancing trainings, formation and equiping infection prevention and control committees and improving motivation to health care workers among other measures.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary

A cross sectional study was conducted in public health facilities in Vihiga Sub County to assess infection prevention and control practices among health care workers. Five public health facilities were selected through purposive and simple random sampling methods. Proportionate sampling method was used to distribute 173 participants in each of the five health facilities. Majority of 111 (64.2%) were female with mean age of 32.9 years while most of the health care workers (59.5%) had attained a diploma level of education.

One of the objectives of this study was to identify factors in health system that influence infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County. Chi square test was conducted to examine the relationship between health system factors; work load of health care worker, IPC trainings, awareness of IPC laws, policies and guidelines and provision of IPC resources by administration, and infection prevention and control practices among health workers. There was significant association between provision of IPC resources by administration and infection prevention and control practices among health care workers. There was also significant association between awareness of other IPC laws and hand hygiene and use of personal protective equipment.

The researcher sought to assess knowledge and practice of infection prevention and control among health care workers in public health facilities in Vihiga Sub County. First, the findings of this study indicate that health care workers in public health facilities in Vihiga Sub County are sufficiently knowledgeable on the basic components of infection. However, most health care workers have not read national guidelines. There was a significant association between reading

national guidelines and infection prevention and control practices. Secondly, this study has indicated that in spite of HCWs adhering with some elements of infection prevention e.g. cleaning hands after touching contaminated objects, use of color coded equipment to segregate hospital wastes and putting on gloves while attending to patients, general compliance with desired infection prevention and control protective measures fall below expected threshold.

The researcher sought to identify barriers to compliance with infection prevention and control standard precautions by health care workers. Through Key Informants, the following were identified as key barriers to compliance with infection prevention and control standard precautions; lack of water supply, lack of person protective equipment and lack of waste management equipment, negative staff attitude, staff shortage and work overload, lack of training, lack of supervision and enforcement of infection prevention and control standards.

6.2 Conclusions

1. Based on results of this study it is concluded that while multimodal and multidisciplinary strategies are necessary to improve infection prevention and control practices, provision of necessary infection prevention and control resources by administration and awareness of infection prevention and control laws by health care workers appear to be prerequisites for better infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County.

2. a) It is concluded from the findings of this study that health care workers were sufficiently knowledgeable on basic components of infection prevention and control. Nevertheless, despite the fact that reading national infection prevention and control guidelines improves compliance with infection prevention and control standard

precautions among health care workers especially hand hygiene practices and use of personal protective equipment, most of health care workers had not read the national guidelines.

b) It is concluded from this study that infection prevention and control practices among health care workers in public health facilities in Vihiga Sub County fall below recommended threshold with low median compliance (<75%).

3. It is concluded from this study that lack of water supply, lack of person protective equipment and lack of waste management equipment, negative staff attitude, staff shortage and work overload, lack of training, lack of supervision and enforcement of infection prevention and control are major barriers to compliance with infection prevention and control standard precautions.

6.3 Recommendations

1. Availability of infection prevention and control resources and awareness of laws concerning infection prevention are control are necessary to improve infection prevention and control practices among health care workers in public health facilities.

2. To improve knowledge and compliance, national infection prevention guidelines should be availed and health care workers sensitized. Efforts should be put in place including motivation of health care workers to improve compliance with infection prevention and control standard precautions.

3. In order to timely identify barriers to compliance with infection prevention and control standard precautions and put in remedial measures; regular supervision and enforcement

of infection prevention and control standard precautions by the County and Sub County health management teams should be encouraged.

6.4 Suggestions for further research

1. The results of present research are limited to public health facilities, extend of compliance among health care workers in different environment could be different. Further studies looking at variety of groups in variety of settings including private clinics and faith based facilities are highly recommended.

2. There is a need for experimental study to evaluate the impact of infection prevention and control resources, reading national guidelines and awareness of other laws on infection prevention and control practices among health care workers.

3. It was difficult to gather reliable data on the burden of health care associated infections in public health care facilities. A research is therefore recommended to highlight prevalence and socio-economic impact of health care associated infections in public health facilities.

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APPENDICES

Appendix I: Questionnaire

QUESTIONNAIRE FOR HEALTHCARE WORKERS
MASENO UNIVERSITY
SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT
MASTER OF PUBLIC HEALTH PROGRAMME

INFECTION PREVENTION AND CONTROL BY HEALTH CARE WORKERS IN PUBLIC HEALTH FACILITIES IN VIHIGA SUB COUNTY, KENYA.

This questionnaire focuses on important factors in infection prevention and control by health care workers in public health facilities in Vihiga Sub County, Kenya. The goal of this study to provide representative information that may help improve infection prevention and control practices in public health facilities. You are therefore kindly requested to respond to the following questions. Please draw a tick in the brackets provided depending on your response.

Health facility code……..

Questionnaire code……..

Interview Date……

Participant code …….....

Name of supervisor……

a) Socio-Demographic Information

1. Gender: Male [ ] Female [ ]
2. Age of Health Care Worker: Below 18 [ ] 20-30 yrs [ ] 31-40yrs [ ] 40-50yrs [ ] 50 yrs and above [ ]
3. Level of Education: Post graduate [ ] Bachelors Degree [ ] Diploma [ ] Certificate [ ] Secondary education [ ] Primary education [ ]

4. Cadre: Medical Officer [ ] Clinical Officer [ ] Nurse [ ] Laboratory tech [ ] Nutritionist [ ] Pharmacist/Pharmaceutical technologist [ ] Public health officer [ ] Support staff [ ] Casual worker [ ] Dental staff [ ]
5. How long have you worked in healthcare service? Less than 2 years [ ] 3-5 years [ ] 6-8 years [ ] Over 9 years [ ]

b) Influence of healthcare system

6. Approximately how many clients/patients do you attend to in a day?

   1-10 [ ] 11-20 [ ] 21-30 [ ] Over 30 [ ]
7. Have you ever been trained Infection Prevention and Control?

   Yes [ ] No [ ]
8. If yes, through which mode were you trained?

   Formal training [ ] OJT [ ] Seminars [ ] CME [ ] others specify……
9. Have you ever seen the national infection prevention and control guideline in this facility?

   Yes [ ] No [ ]
10. Are you aware of any other Kenyan law concerning infection prevention and control?

    Yes [ ] No [ ]
11. Does this facility have working Standard Operating Procedures (SOPs) on infection prevention and control?

    Yes [ ] No [ ]
12. Are you aware of any existing infection prevention and control policy in this facility?

    Yes [ ] No [ ]
13. Does administration in this facility provide all necessary resources for IPC?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

c) Knowledge of Infection Prevention and Control

14. Have you ever read the National guideline on IPC?

Yes [ ] No [ ]

For the questions 15 to 20, please respond by checking true or false.

15. Please respond to the following in regard to health care associated infection.

i. Infection that is acquired in hospitals, often after 48th hour of admission:- True [ ] False [ ]

ii. Occur during provision of healthcare services:- True [ ] False [ ]

iii. Risk of transmission is high if basic infection prevention and control practices are not observed;- True [ ] False [ ]

iv. They are usually already present or incubating at the time of health care delivery:- True [ ] False [ ]

16. The following are sources of health care acquired infections.

i. Hospital waste; True [ ] False [ ]

ii. Patients/clients; True [ ] False [ ]

iii. Healthcare workers; True [ ] False [ ]

17. The following people are at risk of being infected by healthcare associated infection.

i. Patients - true [ ] false [ ]

ii. Healthcare staff - true [ ] false [ ]

iii. Hospital Visitors- true [ ] false [ ]

iv. General public- true [ ] false [ ]

18. Healthcare associated infections are transmitted;

i. Through contact, True [ ] False [ ]

ii. Through contaminated surgical instruments and other equipment, True [ ] False [ ]

iii. Through contaminated laundry, True [ ] False [ ]

19. Observing infection prevention and control practices;

i. Protect hospital clients from healthcare acquired infections, True [ ] False [ ]

ii. Protect healthcare workers from healthcare acquired infections, True [ ] False [ ]

iii. Protect patients from healthcare acquired infections, True [ ] False [ ]

20. The following are important elements of infection prevention and control:

i. Hand hygiene, True [ ] False [ ]

ii. Personal protective equipments, True [ ] False [ ]

iii. Hospital waste management, True [ ] False [ ]

iv. Infection prevention and control committee, True [ ] False [ ]

d) The practice of Infection Prevention and Control and barriers of practice

i) Practice of hand hygiene (please respond by checking in available brackets)

21. What do you often use to clean your hands? (check all that apply)

i. Running water with soap [ ]

ii. Alcohol hand rub [ ]

iii. Water alone [ ]

iv. Don't know [ ]

v. Others specify……..

22. Do you clean your hands before and after attending to every client/patient?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

23. Do you clean your hand before and after putting on gloves?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

24. Do you clean your hands after touching contaminated objects?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

25. Do you clean your hands before preparing medication for clients/patients?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

26. If any of our response in this section is never or sometimes, why?

a) There is no need [ ]

b) Lack of hand cleaning facilities [ ]

c) I'm too busy to clean [ ]

d) Others specify……..

ii) Use of personal protective equipments

27. Do you put on gloves when performing procedures on each patient/client?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

28. If never or sometimes, why?

i. Gloves are not always available [ ]

ii. I'm too busy to change gloves [ ]

iii. Because of unpleasant reactions [ ]

iv. Others specify…….

29. Do you put on gowns, caps, scrub suits or aprons when performing procedures to patients?

Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

30. If never or sometimes, why?

i. They are not available [ ]

ii. There's no need [ ]

iii. Time constraints [ ]

iv. Others specify…….

31. Do you put on respirators when handling clients/patients suspected or confirmed with air-borne infection? Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

32. If never or sometimes, why?

i. They are not available [ ]

ii. Others specify……..

iii) Hospital waste management;

33. Do you use color coded separate containers to segregate your waste? Always [ ] Most of the time [ ] Sometimes [ ] Never [ ]

Appendix II: Observational Checklist for Infection Prevention and Control

OBSERVATIONAL CHECKLIST FOR INFECTION PREVENTION AND CONTROL IN PUBLIC HEALTH FACILITIES IN VIHIGA SUB COUNTY

MASENO UNIVERSITY
SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT
MASTER OF PUBLIC HEALTH PROGRAMME

INFECTION PREVENTION AND CONTROL BY HEALTH CARE WORKERS IN PUBLIC HEALTH FACILITIES IN VIHIGA SUB COUNTY, KENYA.

Observational checklist code……

Name of healthcare facility……

Date……

Name of supervisor……

Availability of Infection Prevention and Control Resources and practice of IPC

a) Infection Prevention and Control Resources Committee (IPCC)

1. Does the facility have IPC focal person? Yes [ ] No [ ]
2. If yes, does s/he perform other duties related to his profession? Yes [ ] No [ ]
3. Does the facility have IPC committee Yes [ ] No [ ]
4. If yes, has the committee held any IPC review meeting in the last three months? Yes [ ] No [ ]

b) Personal Protective Equipment

5. Are gloves adequately available? Yes [ ] No [ ]
6. Are gloves easily accessible by all health care workers? Yes [ ] No [ ]
7. Are caps, aprons and gowns adequately available? Ye [ ] No [ ]
8. Are mackintoshes, plastic aprons or rubber aprons used by HCWs:-

a) In major theater Yes [ ] No [ ]

b) In labor ward Yes [ ] No [ ]

c) In minor theatre Yes [ ] No [ ]

9. Are boots and closed shoes adequately available? Yes [ ] No [ ]
10. Are boots and closed shoes worn by health workers in:-

    a) Major theatre? Yes [ ] No [ ]

    b) Minor theatre? Yes [ ] No [ ]

    c) Labor ward Yes [ ] No [ ]

11. Are prescribed masks worn by healthcare workers in TB clinics? Yes [ ] No [ ]

c) Hand hygiene

12. Does the facility have a tap and a sink with running water in procedure rooms? Yes [ ] No [ ] only in some rooms [ ]
13. Are soap and disposable towels available in every procedure room? Yes [ ] No [ ] only in some rooms [ ]
14. Are waterless antiseptic hand rubs available in procedure rooms? Yes [ ] No [ ] only in some rooms [ ]

d) Biomedical waste management

15. Does the facility collect biomedical wastes using color coded separate containers? Yes [ ] No [ ]
16. Does every procedure room have color coded containers for collection of waste? Yes [ ] No [ ] Only in some rooms [ ]
17. Do the containers have colour coded polythene linings? Yes [ ] No [ ]

18. Does the facility store sharp in puncture proof, leakage prove and temper proof container? Yes [ ] No [ ]
19. Do the handlers of sharps put on Heavy duty gloves when handling the sharps? Yes [ ] No [ ]
20. Is any waste receptacle overfilled at the time of visit? Yes [ ] No [ ]
21. Waste disposal;
    a) Sharps; Incineration in double chamber incinerator [ ] Incineration by open burning [ ] Disposed in normal garbage [ ] Encapsulation[ ] others specify----------
    b) Liquid wastes; Neutralized before being discharge in to sewer system [ ] Discharged in sewer system without neutralization [ ] Others specify ----------
    c) Hazardous wastes; Incineration [ ] Open burning [ ] Burying [ ] Others specify----------
    d) Pathological wastes; Dropped in placenta pit [ ] Buried [ ] Others specify----------

e) Processing medical equipments

22. Does every procedure room have a covered container filled with 0.5% chlorine for immediate decontamination of instruments? Yes [ ] No [ ] Only in some rooms [ ]
23. Does the facility follow the following order in processing used medical equipment: Decontamination in chlorine → Cleaning with soap and water → High disinfection or Sterilization → Use or storage? Yes [ ] No [ ]

24. When is 0.5% chlorine made in procedure rooms? Every morning [ ] After 8 hours [ ] When visibly dirty [ ] After more than 24 hours.

f) Health care facility Environment

25. Do the procedure rooms have cross ventilation? Yes [ ] No [ ]
26. Are sanitary facilities available for staff and clients/patients? Yes [ ] No [ ]
27. How many times is the facility cleaned in a day? Once [ ] Twice [ ] Not every day [ ]
28. Are surfaces smooth and easy to clean (walls, floor, and ceilings)? Yes [ ] No [ ]
29. Is the floor non slip, impervious and smooth? Yes [ ] No [ ]
30. Does the facility have lockable cup boards to store equipments? Yes [ ] No [ ] Only in some rooms [ ]
31. Are the hospital surfaces visibly dusty? Yes [ ] No [ ]
32. Does the facility have policies on triaging of patients based on infectious diseases? Yes [ ] No [ ]
33. Mode of cleaning of facility floors
    a) Dry sweeping [ ]
    b) Wet Mopping for non surgical floors [ ]
    c) Flooding with Scrubbing or frictional cleaning in surgical sites [ ]
    d) Dump dusting on the floors [ ]

Appendix III: Key Informant interview guide

KEY INFORMANT INTERVIEW GUIDE

MASENO UNIVERSITY SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT

MASTER OF PUBLIC HEALTH PROGRAMME

INFECTION PREVENTION AND CONTROL BY HEALTH CARE WORKERS IN VIHIGA SUB COUNTY, KENYA.

Key informant number ……..

Interviewer ……..

Date …… Time ……

Session number……

Instructions

This guide consists of only one section. The respondents include; Sub County Public Health Officer (Vihiga Sub County), Facility in charges of public health facilities in Vihiga Sub County and infection prevention and control focal persons.

Description of respondents

The Sub County Public Health Officer works in the office of Sub County Medical Officer of Health and among his/her duties is to coordinate infection prevention and control at the Sub County level. Facility in charge is the head of a public health facility and all matters affecting that facility including issues of infection prevention and control are addressed by him/her.

Areas to be addressed include:

Theme 1: Barriers to infection prevention and control practices in public health facilities in Vihiga Sub County.

In your opinion, what are factors that hinder compliance to infection prevention and control standard operating procedures?

Appendix IV; Consent form for health care workers

CONSENT FROM HEALTHCARE WORKER

CONTACT FOR THE PRINCIPAL INVESTIGATOR

PRINCIPAL INVESTIGATOR	**CONTACT**
PAUL WALIAULA WEKUNDA	ADDRESS: P.O BOX 193, BUNGOMA. PHONE NUMBER: 0724499856 EMAIL: polweke@gmail.com

MUERC ADDRESS

INSTITUTION APPROVING THE STUDY	**ADDRESS**
MASENO UNIVERSITY ETHICS REVIEW COMMITTEE (MUERC)	ADRRESS: P.O BOX PRIVATE BAG, MASENO. Phone no.+254721543976/ +254733230878

I'm a student from school of Public Health and Community Development, Maseno University with aim of conducting a study on infection prevention and control by healthcare workers in public health facilities in Vihiga Sub County for academic purpose. The results of this study may provide information on the actual practice of infection prevention and control by health care workers in this Sub County thus contributing to the reduction of risks associated with healthcare associated infections. The main objective of this study is to assess infection prevention and control practices by health care workers in public health facilities. You are therefore requested participate fully and observe sincerity in answering the questions.

You are kindly asked to answer questions provided in the questionnaire if you allow us to continue. Similar information is being collected from other healthcare workers in this Sub County. Any information given will be kept confidential. Also, participation in this research is voluntary and may not yield any direct benefit to you and has very minimal or no risk at all. If you agree to participate in the study, you will be required to complete the following consent.

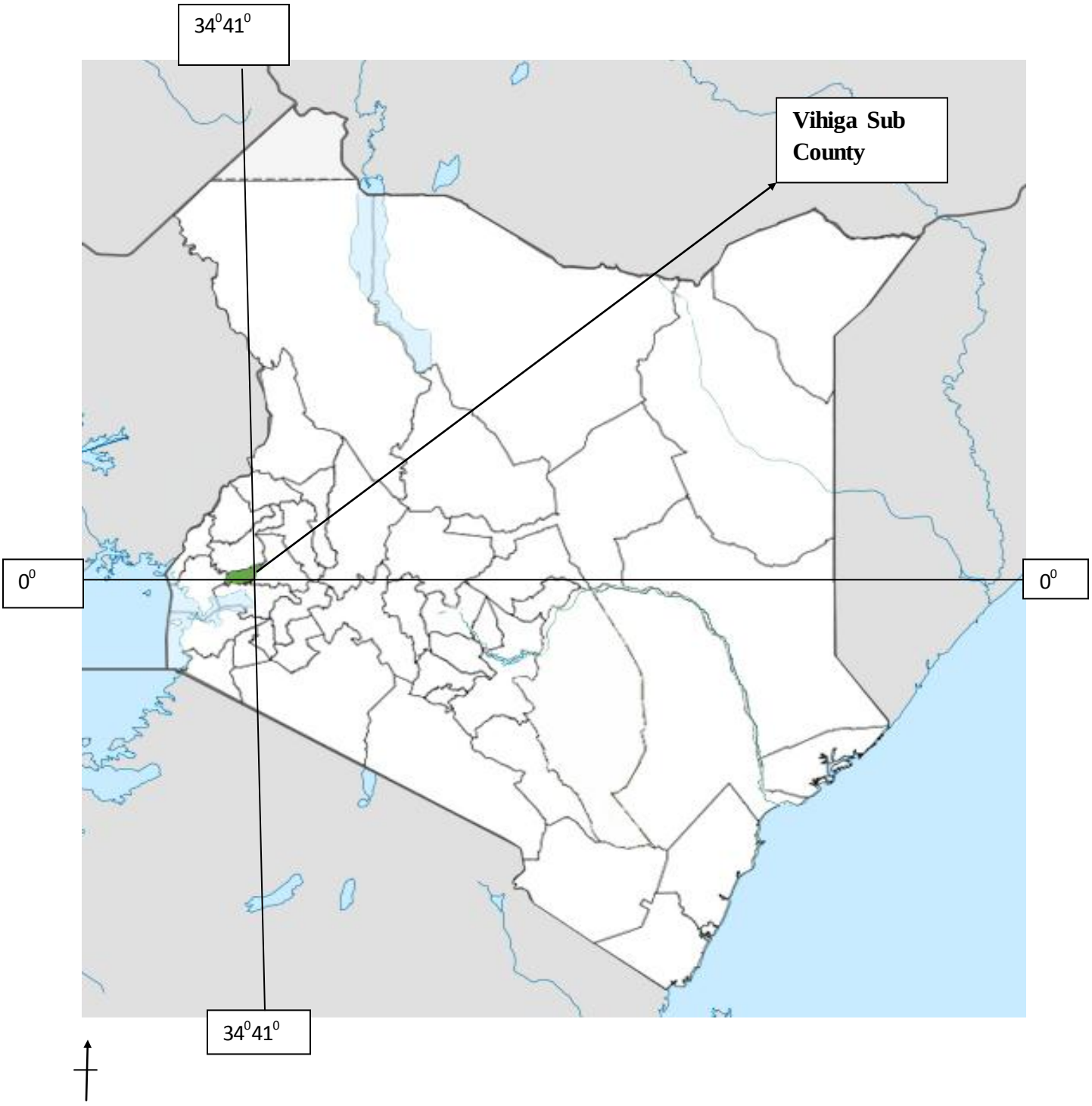
I (Participant code)……consent to participate in the study titled infection prevention and control by health care workers in public health care facilities in Vihiga Sub County, Kenya.

Sign…… Date……

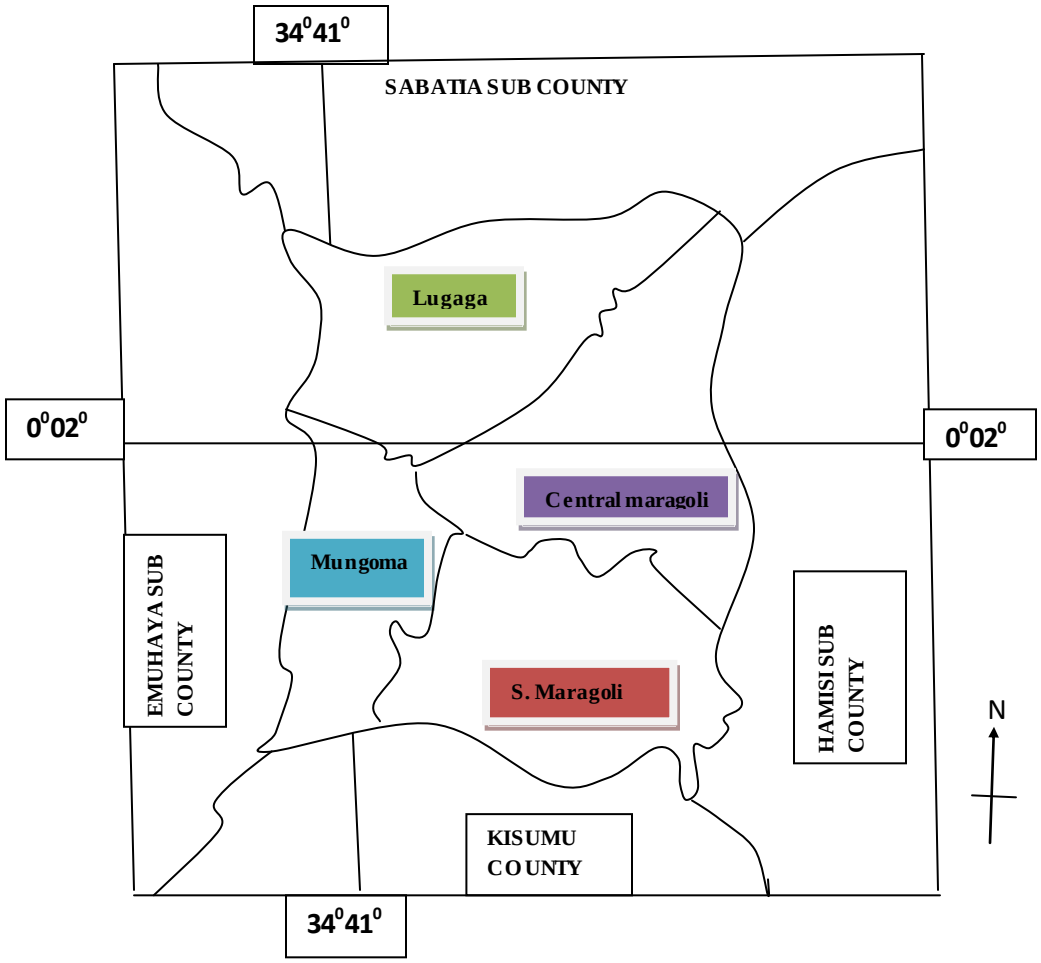
Or

Thumb print…… Date……

Appendix V: Map Kenya indicating Vihiga Sub County



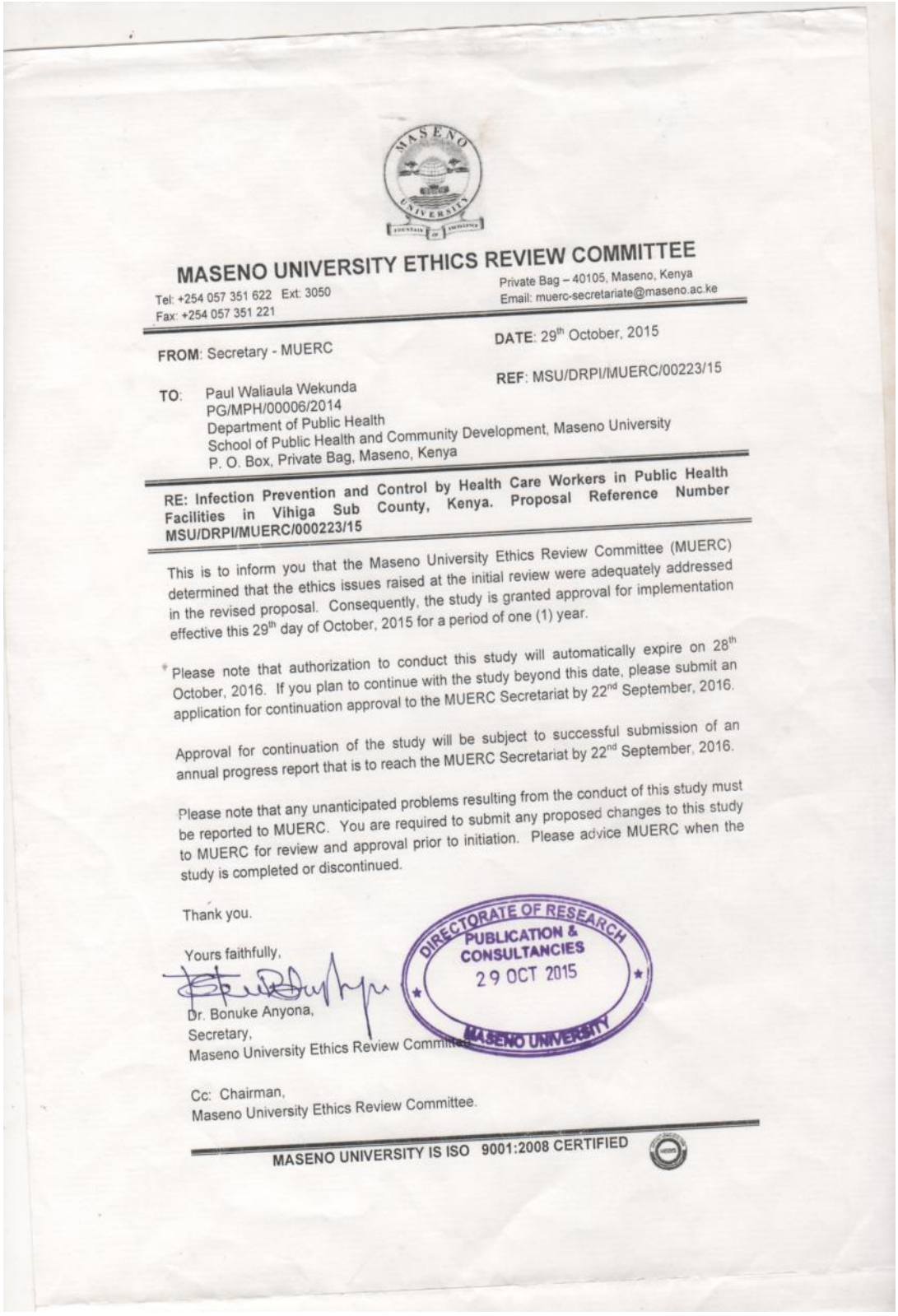
Appendix VI: The Map of Vihiga Sub County



Key:

- **Lugaga/Wamuluma ward;** Bugamangi dispensary, Iduku dispensary, Mulele Dispensary, Vihiga County Referral Hospital, Mbale rural health centre,
- **Central Maragoli ward**; Vihiga Health centre
- **South Maragoli ward**; Egago Dispensary, Enzaro health centre
- **Mungoma ward**; Lyanaginga health centre

Appendix VII: Ethics clearance



MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

FROM: Secretary - MUERC

DATE: 29th October, 2015

REF: MSU/DRPI/MUERC/00223/15

TO: Paul Waliaula Wekunda
PG/MPH/00006/2014
Department of Public Health
School of Public Health and Community Development, Maseno University
P. O. Box, Private Bag, Maseno, Kenya

RE: Infection Prevention and Control by Health Care Workers in Public Health Facilities in Vihiga Sub County, Kenya. Proposal Reference Number MSU/DRPI/MUERC/000223/15

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 29th day of October, 2015 for a period of one (1) year.

* Please note that authorization to conduct this study will automatically expire on 28th October, 2016. If you plan to continue with the study beyond this date, please submit an application for continuation approval to the MUERC Secretariat by 22nd September, 2016.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach the MUERC Secretariat by 22nd September, 2016.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advice MUERC when the study is completed or discontinued.

Thank you.

Yours faithfully,

DIRECTORATE OF RESEARCH PUBLICATION & CONSULTANCIES 29 OCT 2015 MASENO UNIVERSITY

Dr. Bonuke Anyona,
Secretary,
Maseno University Ethics Review Committee

Cc: Chairman,
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED

Appendix VIII: Permission to conduct research

When replying please quote.....
Ref. No: VCHS/CDH/133/15
Email: ahindukhaqb@yahoo.com

THE COUNTY DIRECTOR OF HEALTH
P.O. BOX 344-50300,
MARAGOLI
Date: 1st November 2015

COUNTY GOVERNMENT OF VIHIGA
DEPARTMENT OF HEALTH SERVICES

Paul Wekunda,
Sabatia Health Centre,
P.O. Box 140,
WODANGA.

Dear Sir,

RE: PERMISSION TO CONDUCT RESEARCH ON INFECTION PREVENTION AND CONTROL BY HEALTH CARE WORKERS IN PUBLIC HEALTH FACILITIES VIHIGA SUB-COUNTY KENYA

Having perused through your documents for research proposal and approval from your institution, permission is granted to carry out this study in Vihiga Sub- County.

In view of the selected area, you are advised to involve the Medical Superintendent Vihiga County Referral Hospital, the In-charge Vihiga Health Centre, Enzaro Health Centre, Lyanaginga Health and Mulele Dispensary Health to offer the necessary assistance. At the end of your study kindly share the findings with this office.

Yours sincerely,

COUNTY [illegible] HEALTH SERVICES
VIHIGA

DR. JOEL EDALIA,
Ag. COUNTY DIRECTOR FOR HEALTH - VIHIGA