COMPLIANCE TO HAND HYGIENE AMONG HEALTHCARE WORKERS IN MATERNITY WARDS IN COMPREHENSIVE EMERGENCY, OBSTETRIC AND NEW-BORN CARE HEALTH FACILITIES IN LIRA CITY AND LIRA DISTRICT, UGANDA

LEONARD ROTICH

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UGANDA CHRISTIAN UNIVERSITY

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Declaration

I, Rotich Leonard, hereby declare that this is my original work, is not plagiarised and has not been submitted to any other institution for any award.

Signed:  Date: 28th August, 2025

Rotich Leonard

Reg No: RJ23M21/023

Approval

This is to confirm this research study has been done under my guidance and supervision and is due for submission to the Faculty of Public Health, Nursing and Midwifery of Uganda Christian university.

Signed: _____ Date: 28 August, 2025

Dr. James Okello:

Obstetrician & Gynaecologist

MMED, OBGY-MUST, MBCHB-KIU

Dedication

This work is dedicated to my dear wife, **Sharon Achemonges**, whose unwavering support, patience, and encouragement have been my strength throughout this journey.

To my beloved sons, **Mark and Ethan**, your innocent smiles and boundless love have been a constant source of motivation and joy. You are my greatest inspiration.

May this accomplishment serve as a reminder that with perseverance and faith, all things are possible.

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Acronyms

ABHR	Alcohol Based Hand Rub
BEmONC	Basic Emergency Obstetric and Newborn Care
CEmONC	Comprehensive Emergency Obstetric and Newborn Care
CI	Confidence Interval
CME	Continuous Medical Education
DHIS2	District Health Information Software 2
GHP	Global Hand Washing Partnership
GLOSS	Global Maternal Mortality Sepsis Study
GoU	Government of Uganda
HCAI	Health Care Associated Infection
HCF	Health Care Facility
HCIV	Health Centre Four
HCW	Health Care Worker
HH	Hand Hygiene
HR	Handrub
HW	Handwashing
ICU	Intensive Care Unit
IHR	International Health Regulations
IMMR	Institutional Maternal Mortality Ratio

IPC	Infection Prevention and Control
IPMR	Institutional Perinatal Mortality Ratio
LMICs	Low-and Middle-Income Countries
MMR	Maternal Mortality Ratio
MoH	Government of Uganda, Ministry of Health
PFP	Private-For-Profit
PNFP	Private-Not-For- Profit
REC	Research Ethics Committee
SDG	Sustainable Development Goal
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic and Health Survey
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

Operational Definitions

Aseptic procedure -Any care activity that implies a direct or indirect contact with a mucous membrane, non-intact skin or an invasive medical device. During such a procedure no germ should be transmitted.

Body fluids-Any substance/fluid from the mother/baby's body: blood, urine, stools, vomit, meconium, lochia- secreted: saliva, mucous, milk and colostrum, tears, caseosa (until first bath) - trans-/exudate: amniotic fluid, pus, any biological samples taken from the body (including tissue sample, placenta, cytological sample, organ).

Clean procedure- Any care activity that does not involve a direct or indirect contact with a mucous membrane, non-intact skin or an invasive medical device for example taking the mother's blood pressure or temperature. During such a procedure, there is need to minimize the risk of infection, without necessarily achieving a sterile environment.

Compliance-The proportion of observed hand hygiene opportunities that were followed by appropriate hand hygiene actions, expressed as a percentage. An action was considered compliant if the healthcare worker washed hands with soap and water or used ABHR at the identified opportunity**.**

Hand hygiene opportunity – Any of the five moments when hand hygiene action is needed during health care activities. These include: before touching a patient, before a clean/aseptic procedure, after body fluid exposure risk, after touching a patient and after touching a patient's surroundings.

Hand hygiene-The action of hand cleansing by hand rubbing with an alcohol-based handrub or handwashing with soap and water at any of the five moments of hand

hygiene care. These moments include: before touching a patient, before an aseptic procedure, after exposure to body fluids, after touching a patient, and after touching the patient's surroundings

Hand rubbing- Applying an antiseptic handrub to reduce or inhibit the growth of microorganisms without the need for an exogenous source of water and requiring no rinsing or drying with towels or other devices.

Health care-associated infection (HCAI)- also known as "nosocomial" or "hospital acquired" infection, is an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present at the time of admission.

Infection-Invasion by and multiplication of pathogenic microorganisms in a bodily part or tissue, which may produce subsequent tissue injury and progress to overt disease through a variety of cellular or toxic mechanisms.

Maternity unit/ward-the labour room and the postnatal room where mother and new born are taken care of before discharge

Multimodal strategy: A strategy which consists of several of elements or components (three or more; usually five) implemented in an integrated way with the aim of improving an outcome and changing behaviour.

Point of care - the place where three elements come together: the patient, the health-care worker and care or treatment involving contact with the patient or his/her surroundings.

Standard Precautions- the minimum infection prevention and control practices that should be used in the care of all patients, regardless of their infection status.

Abstract

This study examined compliance to hand hygiene among healthcare workers in maternity wards in Lango subregion, Uganda, where maternal and neonatal mortality remains high, with sepsis being one of the major contributors. Sepsis is often caused by infections spread via healthcare workers' hands. Despite hand hygiene being a simple, cost-effective preventive measure, adherence remains low globally, especially in low-income settings. This mixed-methods cross-sectional study was conducted in CEmONC facilities in Lira City and Lira District. Quantitative data were collected by observations of compliance with the WHO's five moments of hand hygiene, and a checklist to assess availability of hand hygiene resources. Qualitative insights were gathered from interviews of health workers on drivers of compliance. Hand hygiene compliance was suboptimal at 54%, and varied significantly by facility level ($p<0.001$), facility ownership ($p=0.005$) and indication ($p<0.001$). While 83% of the facilities had at least one functioning handwashing facility, only 67% had alcohol-based hand rub (ABHR), with postnatal rooms particularly under-resourced. Key drivers of compliance included both health system factors: availability of supplies, workload and staffing and individual/organizational factors: knowledge and awareness, perceived risk and procedure type, reminders at workplace, monitoring and institutional support, being watched, attitude and beliefs, and hypersensitivity to soap or ABHR. Recommendations include: ensuring consistent supply of hand hygiene materials, particularly in postnatal wards, providing regular training and mentorship, enhancing monitoring and accountability, improving visibility of hygiene protocols, addressing staffing shortages, and conducting further research on adherence to proper hand hygiene techniques.

Chapter 1: Introduction

1.1. Background

Hand hygiene is widely recognized as the single most effective and cost-efficient measure to prevent healthcare-associated infections (HCAIs), including puerperal and neonatal sepsis (Allegranzi & Pittet, 2009). HCAIs affect more than 100 million patients annually globally, with a prevalence of up to 7% in high-income countries and 19% in low- and middle-income (World Health Organization, 2016a). Sepsis, a consequence of HCAIs, remains the third leading cause of maternal death globally (World Health Organization, 2023) and nationally, accounting for 9% of maternal deaths and 7% of neonatal deaths in Uganda (Uganda Ministry of Health, 2023) and 6.4% and 11.5% respectively in Lango Region. Lira Regional Referral Hospital alone reported 76 maternal and 341 neonatal sepsis cases, resulting in three maternal and 18 neonatal deaths in 2023 (DHIS 2, 2024). In addition to mortality, HCAIs can lead to acquisition of multidrug resistant infections, prolonged hospital stays, increased costs and long-term complications such as secondary infertility (Abad et al., 2010; Fenny et al., 2021; Graves, 2004; World Health Organization, 2016a).

Most HCAIs are transmitted via the hands of healthcare workers (Peters et al., 2020; World Health Organization, 2009a), making hand hygiene a cornerstone of infection prevention. The WHO recommends handwashing with soap and water or the use of alcohol-based hand rub (ABHR) at five critical moments: before patient contact, before an aseptic procedure, after exposure to body fluids, after patient contact, and after contact with patient surroundings (World Health Organization, 2009b). The importance of hand hygiene has been recognized since 1847, when Ignaz Semmelweis demonstrated its effectiveness in reducing maternal mortality from childbed fever (Kadar, 2019). Up to 50% of preventable infections during

healthcare could be avoided through consistent and proper hand hygiene (World Health Organization, 2021).

Despite its effectiveness, adherence to hand hygiene remains suboptimal. Globally, up to 61% of healthcare workers fail to follow recommended practices (World Health Organization, 2016b), with compliance levels as low as 9% in some low-income settings (Lambe et al., 2019). In Uganda, hand hygiene compliance in Mulago Hospital labour wards was only 52% (Komuhangi et al., 2019). Previous studies have identified several barriers that include shortage of water, soap, and ABHR, high workloads, insufficient training, and limited managerial support (Ahmadipour et al., 2022; Pratt et al., 2023). A 2015 WHO/UNICEF report revealed that 38% of health facilities worldwide had no water source (World Health Organization, 2015a). In Uganda, only 43% of healthcare facility rooms had a functional handwashing station with soap and water, and less than 10% consistently had alcohol-based hand rub available (Pratt et al., 2023).

While numerous studies have assessed hand hygiene in general healthcare settings, few have specifically focused on maternity wards, where both mothers and newborns are at increased risk of infection. Furthermore, most existing studies come from high-income countries (Lambe et al., 2019), overlooking the contextual challenges of resource-limited settings such as Uganda. Importantly, many assessments have not comprehensively evaluated compliance across all five WHO-recommended moments of hand hygiene (Komuhangi et al., 2019; Pratt et al., 2023), potentially underestimating true compliance and missing opportunities for infection prevention. This gap is particularly notable in the Lango subregion, where no systematic assessment of hand hygiene practices in maternity wards has been conducted, despite the high burden of sepsis.

1.2. Problem Statement

Hand hygiene among healthcare workers is a critical infection prevention measure against healthcare associated infections (HCAIs) including maternal and neonatal sepsis. Yet, global compliance remains low, with only 39% of healthcare workers adhering to recommended practices (World Health Organization, 2016b) and figures as low as 9% reported in low-income countries (Lambe et al., 2019). In Uganda, compliance in labour wards was reported at just 52% (Komuhangi et al., 2019). These persistently low adherence levels are concerning as inadequate hand hygiene directly contributes to maternal and neonatal infections with sepsis substantially contributing to deaths in these populations.

Uganda's maternal mortality ratio (189 per 100,000 live births) and neonatal mortality rate (22 per 1,000 live births) remain above the global targets of 70 and 12, respectively (Uganda Ministry of Health, 2023; United Nations, 2015). Sepsis accounts for 9% of maternal and 7% of neonatal deaths nationally (Uganda Ministry of Health, 2023), and 6.4% and 11% respectively in Lango Region (DHIS 2, 2024). This high sepsis-related mortality highlights an urgent need for strengthened infection prevention practices, yet, there is limited evidence on the level of hand hygiene compliance in maternity settings in Uganda, particularly in Lira City and Lira District, despite their high burden of sepsis-related deaths.

Most prior studies have been in high income countries, focused on general healthcare settings, often without assessing all five WHO-recommended moments of hand hygiene. This study therefore sought to assess hand hygiene compliance among healthcare workers in maternity wards in Lira City and Lira District, considering all five moments, alongside the availability of hygiene resources and the factors influencing compliance.

1.3. General Objective

The main objective of this study was to assess hand hygiene compliance and explore associated factors among health workers in maternity wards in CEmONC facilities in Lira city and Lira district, Lango Region, Uganda.

1.4. Objectives

Specifically, the study aimed to:

- Assess the proportion of hand hygiene opportunities that are followed by hand hygiene actions among health workers in maternity wards in Comprehensive Emergency Obstetric and Newborn Care health facilities in Lira city and Lira district.
- Determine the availability of alcohol hand rub and hand washing facilities in maternity wards in comprehensive emergency obstetric and newborn care health facilities in Lira city and Lira district.
- Establish the drivers of compliance to hand hygiene among health workers in CEmONC health facilities in Lira City and Lira district.

1.5. Research Questions

- What is the level of compliance of health workers in maternity wards to hand hygiene practice?
- What is the availability of alcohol-based handrub and hand washing facilities in maternity wards?
- What are the drivers of hand hygiene compliance among health workers in maternity wards?

1.6. Justification

Maternity wards represent critical healthcare environments where lapses in hand hygiene can lead to maternal and neonatal infections that have devastating consequences for mothers, newborns, the community and the health care system. These consequences include, acquisition of multidrug resistant infections, maternal and neonatal deaths, prolonged hospital stay, increased cost of healthcare and long-term complications such as secondary infertility.

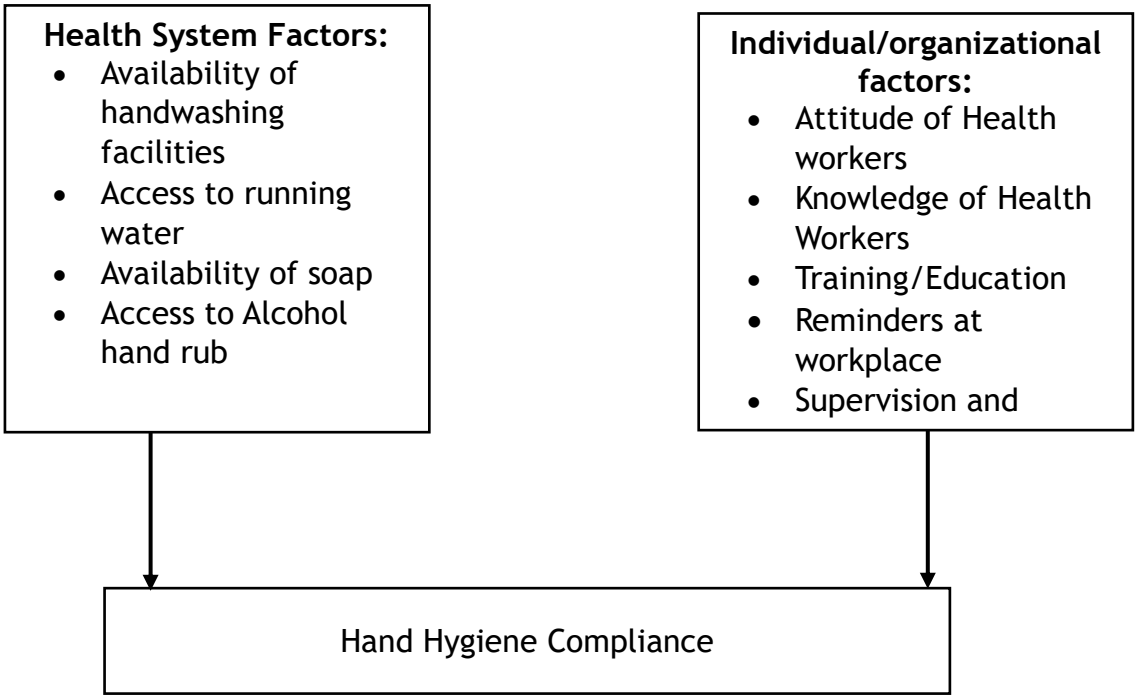
Understanding hand hygiene compliance and its drivers, such as healthcare workers' awareness levels and the accessibility of hand hygiene resources, is essential for designing interventions to improve compliance and reduce transmission of infections. Through the findings of this study, healthcare facilities can identify systemic gaps, optimize resource allocation, and implement evidence-based guidelines, ultimately enhancing patient safety, reducing healthcare costs, and upholding standards of quality care in maternity settings.

1.7. Significance of the Study

This study contributes to the body of knowledge on infection prevention by providing an assessment of hand hygiene compliance across all five WHO-recommended moments in maternity wards of Lira City and Lira District. The findings from the study will inform decisions towards improving hand hygiene such as training to improve health worker knowledge and improving availability of hand hygiene resources. This will in turn reduce risk of infections, thereby enhancing patient safety, reduce health care costs and complications related to maternal and neonatal infections.

1.8. Conceptual Framework

Figure 1: *Conceptual Framework*



This study's conceptual framework is based on the WHO's multimodal hand hygiene improvement strategy *(World Health Organization, 2009a)*. At the core of the framework is Hand Hygiene Compliance, which represents the outcome of interest in this study. Compliance is defined as the proportion of hand hygiene opportunities that are followed by proper hand hygiene actions, such as handwashing with soap and water or the use of alcohol-based hand rub

The framework categorizes influencing factors into two main domains: health system factors and individual/organizational factors. Health system factors include the availability of handwashing facilities, access to running water, availability of soap, and access to alcohol-based hand rubs. These are essential infrastructural components that enable proper hand hygiene practices. Individual/organizational factors comprise the knowledge and attitudes of health workers, training and education, reminders at the workplace, and supervision and monitoring. These

elements shape the behaviour and motivation of health workers towards compliance. The framework aligns with the study's objectives: assessing hand hygiene compliance, evaluating the availability of hygiene resources, and exploring drivers of compliance.

1.9. Theoretical Framework

The study is grounded in two complementary behavioural theories: the Health Belief Model (HBM) and the Theory of Planned Behaviour (TPB), both of which provide useful perspectives for understanding hand hygiene compliance among healthcare workers in maternity wards.

The Health Belief Model postulates that individuals' health behaviours are shaped by their perceived susceptibility to illness, perceived severity of the health consequences, perceived benefits of preventive action, and perceived barriers to action, moderated by cues to action and self-efficacy (Alyafei & Easton-Carr, 2024). In the context of this study, healthcare workers' compliance with hand hygiene is influenced by their perception of the risk of maternal and neonatal infections (susceptibility and severity), the benefits of hand hygiene in preventing infections, and barriers such as resource shortages, high workloads, and time pressures. Workplace reminders, training, and supervision serve as cues to action that reinforce compliance.

The Theory of Planned Behaviour complements this perspective by emphasizing that intention to perform a behaviour is the strongest predictor of actual behaviour, and this intention is shaped by three constructs: attitudes, subjective norms, and perceived behavioural control (Chen & Slade, 2025). Within this study's context, healthcare workers' attitudes toward hand hygiene (whether they view it as important or burdensome), the influence of organizational culture and

peer expectations (subjective norms), and the availability of supplies and supportive systems (perceived behavioural control) collectively determine whether health workers adhere to the WHO's five moments of hand hygiene.

Together, these frameworks highlight that hand hygiene compliance is not only a matter of infrastructure and knowledge but also deeply rooted in healthcare workers' perceptions, motivations, and social-professional context.

Chapter 2: Literature Review

2.1. Introduction

This chapter aims to explore and analyse the status of maternal and new-born health globally and in Uganda, healthcare associated infections and its contribution to maternal and neonatal sepsis, the role of hand hygiene in preventing health care associated infections and existing research and literature relevant to hand hygiene practices in maternity settings.

2.2. Status of Maternal and Neonatal health

The 2030 agenda for sustainable development goals (SDGs) prioritized ending preventable maternal and perinatal mortality with an aim of reducing average global maternal mortality ratio (MMR) to less than 70 maternal deaths per 100,000 live births and neonatal mortality to as low as 12 deaths per 1000 live births (United Nations, 2015). However, the global MMR in 2020 of 223 per 100 000 live births (287,000 deaths) is still higher than the global target. Africa accounted for 69% of global maternal deaths with a MMR of 531 deaths per 100 000 live births. Over 75% of the deaths were due to haemorrhage, infection, high blood pressure (pre-eclampsia and eclampsia), complications during childbirth and unsafe abortion (World Health Organization, 2023).

Uganda has made remarkable strides in reduction of MMR from 336/100,000 live births (UBOS, 2016) to 189/100,000 live births (UBOS, 2023). In the same period, neonatal mortality rate decreased from 27 (UBOS, 2016) to 22 deaths per 1,000 live births (UBOS, 2023), although this is still almost twice the SDG target. Lango region had a lower institutional perinatal mortality ration of 15 per 100,000 live births in 2022/2023 (Uganda Ministry of Health, 2023).

2.3. The burden of Maternal and Neonatal Sepsis

Despite the reduction in maternal and neonatal deaths, sepsis is still an important contributor to preventable maternal and neonatal mortality. Sepsis is defined as "life-threatening organ dysfunction caused by a dysregulated host response to infection" (Singer et al., 2016). However, in this study, maternal sepsis, genital tract sepsis, puerperal fever, puerperal sepsis and puerperal infection will be used synonymously to mean bacterial infection of the genital tract or its surrounding tissues occurring at any time between the onset of labour and six weeks postpartum in which two or more of the following are present: fever, pelvic pain, abnormal/foul smelling discharge from vagina or delay in uterine involution (World Health Organization, 2015b).

Maternal sepsis represents 11% of maternal deaths and significantly contributes to deaths due to other conditions (Bonet et al., 2017). In-hospital maternal infections affect up to 70·4 women per 1000 livebirths with 10·9 per 1000 live births presenting with severe maternal outcomes. On average, the case fatality rate among women with infection-related severe maternal outcomes is 7%, although fatality rates as high as 15% have been reported in lower income countries (World Health Organization Global Maternal Sepsis Study (GLOSS) Research Group, 2020). In Ethiopia for example, 10.9 cases of maternal sepsis occur per 1,000 live births with a case fatality rate of 7.4% and a maternal mortality ratio due to sepsis of 75 per 100,000 live births from (Abera et al., 2024). Up to 20% of women who undergo a caesarean section in Africa get a surgical site infection, causing morbidity and affecting their ability to care for their newborn (World Health Organization, 2016b). In 2022/2023 financial year, pregnancy related sepsis was the third leading cause of maternal mortality in Uganda causing

9% of maternal deaths after haemorrhage (40%) and hypertensive disorders in pregnancy (16%). In Lango subregion, 6.4 % of maternal deaths were sepsis related (Uganda Ministry of Health, 2023).

Among babies born in hospital, neonatal sepsis is the third leading cause of death after premature birth and birth asphyxia (World Health Organization, 2024) and is responsible for 4%-56% of all causes of neonatal deaths. Annually, sepsis affects 3 million newborns and can kill up to 500,000 neonates worldwide (World Health Organization, 2018). In Uganda, neonatal sepsis was the third leading cause of neonatal mortality causing 7% of neonatal deaths in 2022/2023 after birth asphyxia (60%) and prematurity (23%) (Uganda Ministry of Health, 2023). In Lango region, 11.5% of neonatal deaths were sepsis related (DHIS 2, 2024). CEmONC sites had higher institutional maternal mortality ratio (IMMR) and institutional perinatal mortality ratio (IPMR) compared to BEmONC sites (Uganda Ministry of Health, 2023).

2.4. Impact of Hospital Acquired Infections

Every year, more than 100 million patients worldwide suffer from healthcare-associated Infections (HCAIs). Up to 7% of patients in developed countries and 5.7%-19.1% from low- and middle-income countries will acquire at least one HCAI at any particular time (World Health Organization, 2016a) .

Healthcare-associated infections (HCAIs) have major impacts on morbidity, mortality, and overall quality of life. Excess mortality due to these infections is as high as 29.3% in African adults (World Health Organization, 2016a). In addition, an estimated 1 million new-born deaths associated with maternal infections occur annually (World Health Organization, 2015b). HCAIs also present a significant economic burden to society (World Health Organization, 2016a). Costs to patients

and informal care takers result from out-of-pocket expenditure and other quality of life related consequences (death, pain, discomfort, psychological trauma) (Abad et al., 2010). For example, puerperal sepsis causes 33.5%-46.8% increases in average direct healthcare costs (Fenny et al., 2021). There is also a substantial extra cost to health services due to the increased duration of hospital stay as well as unnecessary investigations and treatment and additional time needed to perform patient care (Graves, 2004). Extended duration of hospital stays due to healthcare-associated infections (HCAIs) in developing countries ranges from five to 29.5 days (World Health Organization, 2016a). Women who experience infections during delivery are also at risk of long-term disabilities such as chronic pelvic pain, fallopian tube blockage and secondary infertility (World Health Organization, 2015b).

2.5. Role of Hand Hygiene in prevention of HCAIs and Sepsis

Most cases of puerperal and neonatal sepsis are acquired within the healthcare setting. In 1847, Professor Ignaz Phillip Semmelweis was able to link puerperal sepsis to transmission of infections by health workers while providing care. Childbed fever was the main cause of maternal mortality at the time. He demonstrated that medical students transferred causative agents from dead bodies to mothers in labour with their hands after assisting at post-mortems, and soon discovered that it could also be transferred from living persons with pus forming infections (Kadar, 2019). Without hand hygiene, progressive contamination of healthcare workers' hands possesses a risk to patient safety (World Health Organization, 2009a). For example, in two tertiary hospitals in Uganda, more than one-third of healthcare worker's hands were contaminated with disease-causing micro-organisms, with over 50% of isolates being drug resistant (Bulwadda et al.,

2023; Ssemogerere et al., 2019). Poor hand hygiene practices amongst health workers have been identified as one of the major factors contributing to healthcare associated infections (Global Hand Washing Partnership, 2018).

Most HCAIs can be prevented by ensuring effective IPC measures (Global Hand Washing Partnership, 2018). According to the international health regulations, effective IPC is a key strategy for dealing with public health threats of international concern. Recently, the United Nations sustainable development goals (SDGs) highlighted the importance of IPC as a contributor to safe, effective, high quality health service delivery (World Health Organization, 2016a). Improved sanitation, water quality and availability, and IPC measures can reduce death among women by over 17,000 annually (Hussein et al., 2011). For most HCAIs, prevention is less costly than treatment (Graves, 2004).

Hand hygiene is at the heart of standard precautions and is the single most effective infection control measure to control the spread of disease-causing microorganisms in health care (Allegranzi et al., 2013; World Health Organization, 2009a). Ignaz Philipp Semmelweis's in his revolutionary research demonstrated that disinfecting hands lowered maternal mortality from childbed fever three- to ten-fold (Kadar, 2019). Hand hygiene is also emphasized in the WHO multimodal strategy for the prevention of HCAIs (World Health Organization, 2009a). Hand hygiene improvement programmes can prevent up to 50% avoidable HCAIs and save up to 16 times the cost of implementation (World Health Organization, 2021).

Hand hygiene involves rubbing hands with an alcohol-based handrub (ABHR) or washing with soap and water. The technique for doing this, as well as the product used (Soap or alcohol), render hands free from potentially harmful contaminants and make them safe for patient care (World Health Organization, 2009a). For

effective hand hygiene, all staff in healthcare facilities must wash or disinfect their hands at five critical moments which correspond to the **"five moments" of hand hygiene"** (World Health Organization, 2009a). In the maternity ward the five moments of hand hygiene include: before touching the woman/new-born, before a clean/aseptic procedure(such as vaginal examination or intravenous access), after body fluid exposure (for example after vaginal examination, rapture of membranes or delivery of the placenta), after touching the woman/new born (for example touching skin), after touching the woman/newborn's surroundings(such as woman or newborn's beddings, or woman's file at the bedside) (World Health Organization, 2020).

During the sequence of care of mother and baby during delivery, multiple opportunities for hand hygiene usually occur. But due to the high maternal, neonatal and health care worker's risk of infection, meeting the requirements for hand hygiene is very important despite the high frequency of opportunities (World Health Organization, 2020). Compliance or non-compliance with hand hygiene has consequences for the transmission of pathogens and the development of HCAIs (World Health Organization, 2009a) and therefore all birth attendants should be competent in the hand hygiene technique (World Health Organization, 2018).

2.6. Compliance to Hand Hygiene

Although proper hand hygiene is a key measure to circumvent the transmission of pathogens, compliance of healthcare workers to hand hygiene is still poor worldwide.

For an effective prevention of healthcare associated infections, the WHO has recommended a hand hygiene compliance rate of more than 90% (Pittet & Donaldson, 2005; World Health Organization, 2009c), but on average, only 39% of

healthcare workers adhere to recommended handwashing practices (World Health Organization, 2016b) and compliance levels as low as 9% have been reported for health-care facilities from low-income countries. Levels of compliance tend to differ between high-income countries (64.5%) and low-income countries (9.1%) and between different types of healthcare workers: nurses 43.4%, physicians 32.6%, other staff 53.8% (Lambe et al., 2019). One study in Kathmandu, Nepal showed that hand hygiene compliance also varied by indication with hand hygiene most likely to be done after body fluid exposure and least likely after contact with patient surrounding (Duwal et al., 2024). In maternity wards, compliance with hand hygiene guidelines also remains suboptimal worldwide (de Kraker et al., 2022)).

Despite the global evidence of low adherence to hand hygiene, few studies have been done to assess hand hygiene adherence in Ugandan maternity wards. One study in Mulago showed the overall hand hygiene compliance was at 52% in labour wards (Komuhangi et al., 2019), although only two domains were considered; before and after touching the patient. In addition, this study was done in a national referral hospital which may be having more resources compared to the lower health facilities. In another study to assessed access to and use of hand hygiene resources during the COVID-19 pandemic in two districts in Uganda, hand hygiene compliance before patient encounters was only 26% and 50% after patient encounters, with an overall hand hygiene compliance of 38% (Pratt et al., 2023). This study also focused on only two hand hygiene opportunities, before and after patient contact and did not specifically look at maternity setting. In addition, this study was done in the midst of Covid-19 pandemic, a period in which hand hygiene

was heightened as a control measure for spread of COVID-19. Hand hygiene compliance could have changed following resolution of the pandemic.

2.7. Drivers of Compliance to Hand Hygiene

Multiple studies point to knowledge gaps and limited water hygiene and sanitation (WASH) services in health care facilities as major drivers of poor hand hygiene compliance (Ahmadipour et al., 2022; Antinozzi et al., 2023; Gon, de Barra, et al., 2020). A cross-sectional study in Nigeria also cited unavailability of soap (88%) and irregular water supply (51%) as the main reasons for poor hand hygiene (Global Hand Washing Partnership, 2018). A 2015 WHO/UNICEF global report revealed that 38% of health care facilities had no water source. Soap and water or alcohol-based handrubs for hand hygiene were absent in over one third of the health facilities (World Health Organization, 2015a). In the Ugandan study involving two districts during covid-19 outbreak, only 9.1% of the health facilities reported always having sufficient amount of ABHR, 33% reported not having enough water for handwashing. Inside health facilities, 64% of admission rooms contained hand hygiene materials, but only 43% of all healthcare facility rooms contained a functional handwashing station with soap and water (Pratt et al., 2023) . Another study in Kampala metropolitan area, showed that over 41.6 % of the health facilities did not have a fully functional hand hygiene facility in patient care areas (Kayiwa et al., 2020).

In addition to lack of handwashing facilities, knowledge gap among health workers is one of the major barriers to hand hygiene in addition to other factors such as improper attitude and heavy workloads (Ahmadipour et al., 2022). In most times, healthcare workers are unaware of the consequences of poor hand hygiene practices, including antibiotic resistance, length of hospital stay, nosocomial

infections, and even mortality. The absence of awareness of staff contributes to non-compliance with hand hygiene (Ahmadipour et al., 2022). On the contrary, more knowledge about hand hygiene and an environment with more reminders have been shown to be associated with more hand rubbing/washing (Gon, Virgo, et al., 2020). I one systematic review of 15 studies, IPC education of frontline health care workers using practical, hands-on approach was associated with improved hand hygiene compliance and lower incidence of HCAIs (World Health Organization, 2016a). Other drivers of compliance include motivational factors such as social influences, acuity of care, self-protection, and use of cues (Smiddy et al., 2015).

2.8. Summary of Literature

Existing literature indicate that global and national maternal and neonatal mortality rates are still higher than UN targets, with neonatal and maternal sepsis substantially contributing to these deaths. Neonatal and maternal sepsis are often as a result of healthcare associated infections (HCAIs) which are commonly transmitted by health worker's hands. Although hand hygiene is the single most effective method for preventing HCAIs, compliance among health workers is still low. Knowledge gaps and lack of hand hygiene resources in health care facilities are major drivers of poor hand hygiene compliance. However, most studies on hand hygiene compliance were conducted in high-income countries (60.7%) which may overlook the contextual factors specific to Ugandan maternity settings, such as resource constraints, and infrastructure limitations. In addition, most studies focused on general health care rather than maternity setting. Thirdly, most studies did not consider all the five moments of hand hygiene in their assessment. No literature is available on hand hygiene compliance in Lango Region.

Chapter 3: Methodology

3.1. Study Design

This study was a descriptive, mixed methods cross sectional study that was conducted over a three-month period (March 2025-May 2025). Quantitative methods were used to assess compliance to hand hygiene and measure availability of handwashing facilities and alcohol handrub in maternity wards. Qualitative methods were used to explore the drivers of compliance to hand hygiene among health workers in maternity wards.

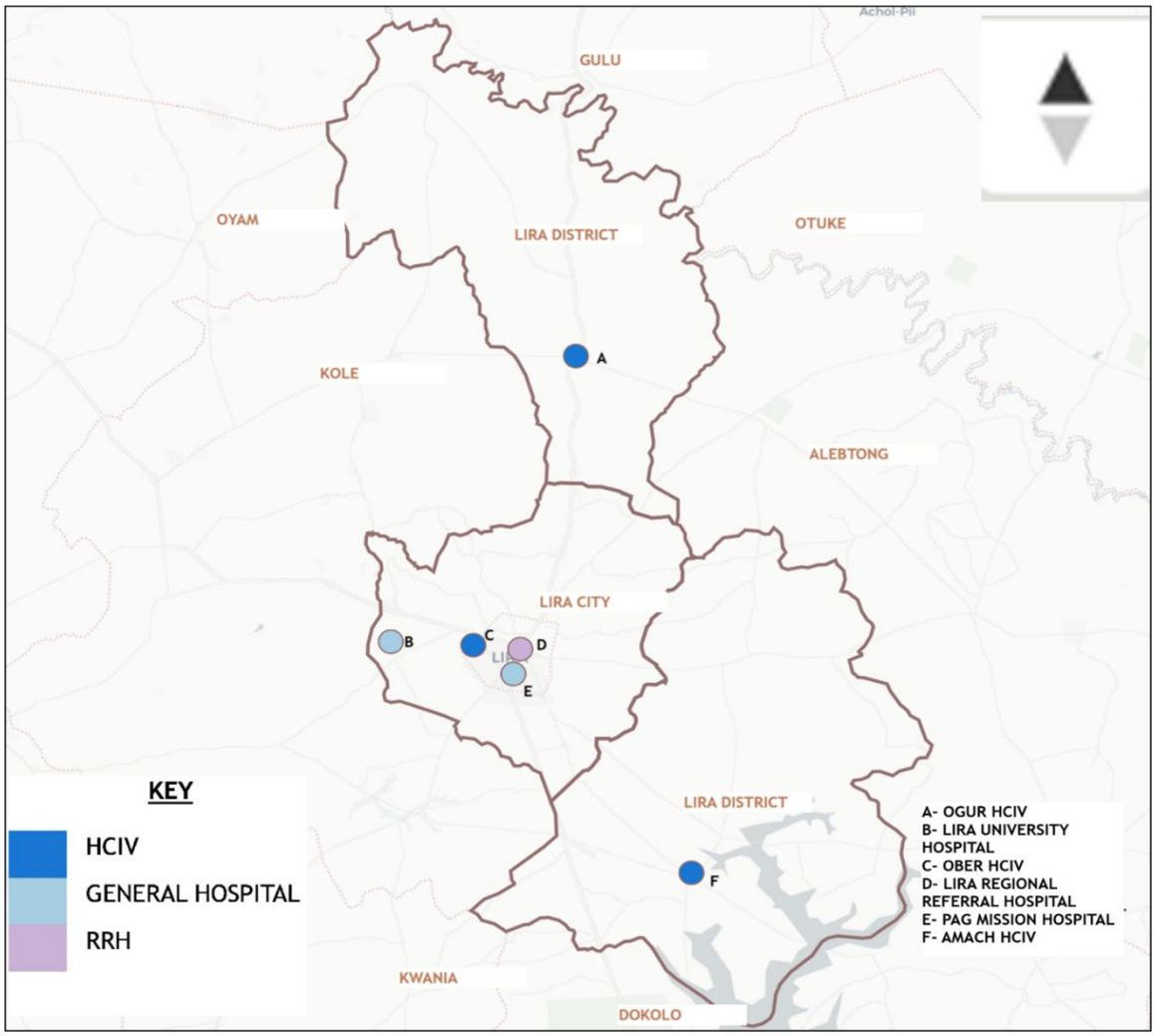
A mixed methods research design was adopted in this study to enable a thorough understanding of both the extent of hand hygiene compliance, availability of hand hygiene resources and the underlying factors influencing it. Assessing the level of compliance and availability of handwashing facilities and alcohol-based handrub required numerical data that could be quantified through structured observation. Qualitative methods were ideal for establishing the drivers of compliance to hand hygiene because it required in-depth exploration of health workers' perspectives, beliefs, routines, and environmental influences. Using a mixed methods design also allowed for complementarity, where the qualitative findings provided context and explanation for the patterns observed in the quantitative data (Creswell & Clark, 2017).

3.2. Study Area

The study was carried out in Comprehensive Emergency, Obstetric and New-Born Care (CEmONC) health facilities in Lira city and Lira district in Lango Sub-region, Northern Uganda. Health facilities were selected based on their designation as CEmONC sites and their provision of maternity services. These included: Lira Regional referral hospital, Lira university hospital, PAG mission

hospital and Ober HCIV in Lira city; Ogur HCIV and Amach HCIV in Lira District. CEmONC health facilities were chosen as they have higher institutional maternal mortality ratio (IMMR) and institutional perinatal mortality ratio (IPMR) compared to Basic Emergency, Obstetric and New-Born Care (BEmONC) sites (Uganda Ministry of Health, 2023). In addition, CEmONC health facilities had the highest number of maternal and neonatal infections (DHIS 2, 2024) with the majority of cases in Lango region in Lira Regional Referral Hospital.

Figure 2: *Map of Lira city and Lira district showing location of study sites*



Lira Regional Referral Hospital (Lira RRH)

Lira RRH is a tertiary hospital located in Lira city. It provides specialized curative, preventative, promotional, and rehabilitative services. Lira RRH serves nine districts and Lira City in the Lango sub-region with a catchment population of approximately 2.7 million people. It has a 401-bed capacity and employs 334 staff directly hired by the Government of Uganda with 88% of the 381 civil service approved positions filled (Uganda Ministry of Health, 2024).

LRRH is a designated internship centre in which graduates of Ugandan medical schools can complete one year of supervised internship under various disciplines that exist in the hospital. The hospital also acts as a training institution for Lira University medical, nursing and midwifery students. It also offers satellite training for postgraduate medical students in different fields of study. During the financial year 2023/2024 the hospital had a total of 6,028 deliveries, of which 1,925 were caesarean sections. A total of 76 mothers were admitted with pregnancy related sepsis while 341 babies had neonatal sepsis. Three (3) of the mothers died of pregnancy related sepsis while 18 babies died of neonatal sepsis within 0-7 days of birth (DHIS 2, 2024). Currently there are seven specialists attached to maternity ward, four hired by GoU with one Senior consultant, three are supported by Lira university to support student training. Fifteen (25) Midwives are attached to the labour ward

Lira University Hospital

Lira University Hospital is a University Teaching Hospital for training medical and allied health students. The hospital also offers clinical services to the communities in and around the University and sometimes receive referrals from outside the Lango Sub region. It is a 110-bed hospital which started offering

medical care services in October 2018. The hospital provides general and specialized services in surgery, obstetrics and gynaecology, internal medical, paediatrics, urology and mental health. This is a public hospital which charges a modest fee that is used for procuring medicines and medical supplies. Lira University Teaching Hospital has a pool of consultants who provide specialized consultancy services to clients and help train students and mentor younger faculty staff. The hospital had two specialists and 14 midwives attached to maternity ward. Lira Regional University Hospital serves a catchment population of 9,510 people. During the financial year 2023/2024, the hospital had a total of 255 deliveries, of which 81 were caesarean sections. A total of two mothers were admitted with pregnancy related sepsis while 18 babies had neonatal sepsis. No sepsis related death was reported (DHIS 2, 2024).

PAG Mission Hospital

The Pentecostal Assemblies of God (PAG) Mission Hospital is a Faith-Based, Not-for-Profit Institution, situated Lira East Division in Lira City. The Hospital is a member of UPMB (Uganda Protestant Medical Bureau) and is registered with the Ministry of Health. The Hospital serves a catchment population of 22,640 people. The hospital has one medical officer and nine midwives attached to maternity ward. During the financial year 2023/2024, the hospital had a total of 862 deliveries, of which 385 were caesarean sections. A total of 24 mothers were admitted with pregnancy related sepsis while 159 babies had neonatal sepsis. No sepsis related death was reported.

Ober Health Centre IV

Ober HCIV is a public health facility located in Lira West Division within Lira city. The health facility has only 35% of approved post filled: one medical officer

and two enrolled midwives and serves a catchment population of 34,330 people. Ober HCIV is an accredited CEmONC health facility but at the time of the study, the facility was unable to carry out caesarean deliveries pending completion of the theatre. However, all other maternity and postnatal services were being provided. During the financial year 2023/2024, the health facility had a total of 12,219 deliveries. A total of 28 mothers developed pregnancy related sepsis while one baby had neonatal sepsis. No sepsis related death was reported (DHIS 2, 2024).

Ogur Health Centre IV

Ogur Health Centre IV is a public health facility located in n Ogur subcounty, Erute County, Lira District. The facility serves a catchment population of 33,068 people. During the financial year 2023/2024 the hospital had a total of 1416 deliveries, of which 208 were caesarean sections. A total of eight mothers were admitted with pregnancy related sepsis while nine babies had neonatal sepsis. No sepsis related death was reported (DHIS 2, 2024).

Amach Health Centre IV

Amach HCIV is a public health facility located in Erute South County, Amach Town Council, Lira District. The health facility serves a catchment population of 18,066 people. Amach HCIV conducts and average of 894 deliveries annually with 69 caesarean sections. In 2023/2024, the facility registered one maternal death but no sepsis related maternal or neonatal death.

3.3. Study Population

The study population included all health workers who directly participated in provision of maternity services (labour and delivery) in Comprehensive Emergency Obstetric and Newborn care health facilities within Lira city and Lira district. These included midwives, medical officers and obstetricians and gynaecologists. A

total of 60 health workers in the above categories were attached to maternity wards across the six health facilities.

3.4. Sample Size

A total of 52 health workers were observed across the six health facilities and 12 key informant interviews were conducted among health workers.

3.5. Sample Size Determination

The sample size for quantitative assessment was determined using the Krejcie and Morgan table (Bukhari, 2021). In the study area there were a total of 60 health workers attached to maternity wards across the six health facilities. Therefore, 52 health workers were selected to participate in the study. For qualitative assessment, the interviews were conducted until saturation was reached resulting in a total of 12 interviews.

3.6. Sampling Technique

For quantitative assessment, proportionate sampling technique was used to select health workers per health facility based on the number of health workers in maternity ward. The number of health workers within each health facility were selected by simple random sampling. Purposive sampling was used to select health workers to be interviewed for qualitative assessment to ensure all cadres of midwives and doctors and all six health facilities were represented. The interviews were conducted until saturation was reached.

3.7. Inclusion Criteria

Health workers who directly participated in provision of maternity services (labour and delivery) were included. These included midwives, medical officers and obstetricians and gynaecologists.

3.8. Exclusion Criteria

Health workers who were still in training (residents, interns, medical, nursing and midwifery students) were excluded.

3.9. Data Collection Tools

1. A hand hygiene observation form adapted from WHO hand hygiene observation form was used to assess compliance to hand hygiene (World Health Organization, 2009b).
2. A checklist adapted from the WHO ward infrastructure survey form (World Health Organization, 2009b) was used to assess availability of handwashing facilities and alcohol hand rub in the maternity wards.
3. A researcher administered interview guide was used to explore drivers of hand hygiene compliance

3.10. Validity and Reliability of Data Collection Tools

The hand hygiene observation form and the checklist were adapted from the WHO hand hygiene observation form and ward infrastructure survey form, respectively, to enhance validity and ensure alignment with internationally recognized standards. Direct observation of hand hygiene compliance is the gold standard for assessing hand hygiene at all moments (Bredin et al., 2022).

The interview guide was pretested with three health workers: an enrolled midwife, a registered midwife, and a medical doctor from a facility outside the study sites to minimize bias. This diverse group ensured that the tool was clear, relevant, and applicable across cadres involved in maternity care. The pre-test examined the clarity, flow, and contextual appropriateness of the questions, particularly those exploring drivers of hand hygiene compliance, as well as the effectiveness of probes and the overall length of the interview. Feedback obtained

during this process informed minor revisions that improved the structure, wording, and capacity of the tool to generate meaningful responses aligned with the study's objectives.

3.11. Study Procedure

3.11.1. Identification and engagement of Study Facilities

Health facilities were selected based on their designation as Comprehensive Emergency, Obstetric and New-Born Care (CEmONC) sites and their provision of maternity services. Written permission was sought from relevant district health officers and presented to the in-charges of the health facilities. The objectives of the study were explained to the facility leadership and their cooperation was sought.

3.11.2. Identification and Recruitment of Participants

Participants were assessed for eligibility, which included being actively engaged in providing maternity services during the study period and not being a health worker in training. Verbal and written consent were obtained from each eligible healthcare worker. To minimise bias, the observers notified the health care workers that they were observing medical procedures but did not specify that they were observing hand hygiene. Participation was voluntary, and confidentiality was assured.

3.11.3. Quantitative data collection

Research assistants trained using the WHO hand hygiene technical reference manual observed the health workers for hand hygiene during their scheduled duties including at night and during weekends. Each selected healthcare worker was observed for 30 minutes while they had direct contact with women and babies. Each observed instance where hand hygiene was indicated was recorded as

an opportunity. The corresponding action taken (handwashing with soap and water, use of alcohol-based hand rub, or missed hand hygiene) was documented. Handwashing or hand rubbing actions were recorded against the five indications: before patient contact, before an aseptic procedure, after risk of exposure to body fluid, after patient contact and after contact with patient surroundings. The cadre of the facility staff observed was noted. This was done in a way that did not interfere with service delivery. Each observation form was dedicated to one health worker.

Availability of Hand hygiene infrastructure was assessed using a checklist. This was filled by the research assistant while observing the hand hygiene compliance. One checklist was filled per health facility.

3.11.4. Qualitative Data Collection

In-depth face to face interviews were conducted with selected participants to explore barriers and facilitators of hand hygiene compliance. Interviews were conducted English language in a private setting within the facility, either in a designated spare room or in a shaded area within the compound. An interview guide was used to explore the drivers of hand hygiene compliance. With participants' permission, a voice recorder was used, and additional notes were captured by the interviewer. Data collection continued until concurrent interviews showed repetitive responses, with no new insights emerging. To avoid bias, the interviews were conducted after all the selected health workers in the facility had been observed for hand hygiene.

3.12. Data management

Observational data on hand hygiene opportunities and actions were first recorded manually using the adapted WHO hand hygiene observation form.

Completed forms were checked daily by the principal investigator to ensure completeness and consistency before entry. The data were entered into STATA version 15 by the principal investigator. The entries were double checked against the original forms to ensure accurate entries. Data cleaning involved checking for missing values, logical inconsistencies (e.g. a recorded hand hygiene action without an opportunity), and duplicate entries. Finalized datasets were stored in password-protected computer with a backup maintained on Microsoft OneDrive cloud-based storage accessible only to the principal investigator.

Key informant interviews were audio-recorded with participant consent and later transcribed verbatim. The transcripts were reviewed against recordings for accuracy and anonymized by removing any identifiers. Transcripts were imported into QDA Miner Lite version 3.0.7 for coding. All electronic transcripts and coded files were stored on a password-protected computer, with copies stored on Microsoft OneDrive.

3.13. Data analysis

STATA version 15 was used to conduct descriptive analysis of hand hygiene opportunities and actions by indication, category of staff, level of facility, and facility ownership. Hand-hygiene compliance was expressed as the proportion of predefined opportunities that were followed by handrub or handwashing.

$$Compliance = \frac{Actions}{Opportunities}\ X\ 100$$

To determine whether observed differences in compliance to hand hygiene were statistically significant, appropriate tests of significance were applied based on the type of comparison. A Chi-square test of independence was used to compare compliance across different indications, cadres and facility levels. A two-

proportion z-test was used to compare compliance rates by facility ownership (Government vs. PNFP). Statistical significance was determined at the 5% level ($p < 0.05$). The 95% confidence intervals for proportions were also reported to provide estimates of precision for each compliance rate.

Availability of hand hygiene infrastructure was analysed by health facility, level of facility, and facility ownership. A functional hand washing facility was defined as one with water and soap.

Qualitative data were analysed by thematic analysis to identify key themes and patterns related to drivers of compliance. The transcripts were coded using QDA Miner Lite version 3.0.7 and recurring themes identified. The themes were organized into categories representing drivers of compliance.

Quantitative data (hand hygiene compliance rates and availability of handwashing facilities and ABHR) were compared and contrasted with qualitative insights (drivers of compliance).

3.14. Quality Control

To avoid bias arising from individuals modifying their behaviour after knowing they are being observed, the observer notified health care workers that they were observing medical procedures but did not specify that they were observing hand hygiene.

The interviews were conducted after all the selected health workers in the facility had been observed for hand hygiene compliance.

Data was double-checked for accuracy and completeness and data cleaning, including resolution of missing or erroneous data was done before analysis.

3.15. Ethical Considerations

- Ethical approval was obtained from the Research Ethics Committee (REC) of Uganda Christian University
- Permission to carry out the study was sought and granted by respective district health offices and health facility administration.
- Confidentiality was maintained as personal identity of health workers was not recorded during observation.

Chapter 4: Results

4.1. Introduction

This section presents the findings from the assessment of hand hygiene compliance and its drivers among health workers in maternity wards across Comprehensive Emergency Obstetric and Newborn Care (CEmONC) facilities in Lira city and Lira district, Uganda. The data were gathered through both quantitative and qualitative methods. The quantitative findings will be presented first, focusing on the proportion of hand hygiene opportunities followed by appropriate actions, as well as the availability of handwashing and alcohol-based handrub facilities in the maternity wards. The qualitative findings will then be presented to provide insight into the key drivers of hand hygiene compliance as reported by health workers. The quantitative results are organized by staff category, facility level, and the specific hand hygiene opportunity.

4.2. Quantitative Findings

4.2.1. Demographic Characteristics of Study Participants.

A total of 52 health workers were observed during the study

Table 1: *Demographic characteristics of participants*

Category	Frequency	Percentage
Gender		
Male	13	25%
Female	39	75%
Cadre		
Enrolled Midwife	22	42%
Registered Midwife	19	37%
Doctor	11	21%
Facility Level		
Regional Referral Hospital	19	36%
General Hospital	23	44%
HCIV	10	19%

The majority of participants, 39 (75%) were female while 13 (25%) were male.

The highest number of participants were enrolled midwives, 22(42%), and the least were doctors,11(21%).

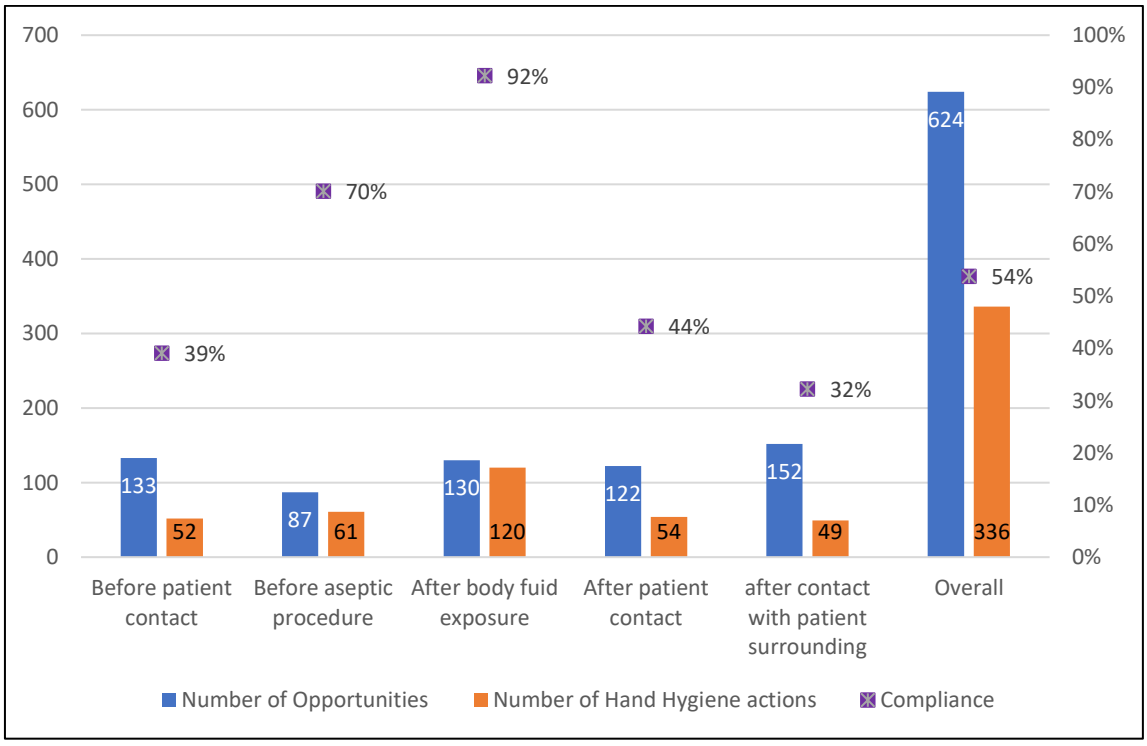
By facility level, 23(44%) of participants were from General Hospital, 19(36%) were from Regional Referral Hospital and 10(19%) were from HCIV

4.2.2. Overall Compliance to Hand Hygiene

A total of 624 hand hygiene opportunities were observed across the six health facilities. Of these, 336 hand hygiene actions were taken, giving an overall compliance rate of 54%, 95% CI [50,58]

4.2.3. Compliance by Indication

Figure 3: *Compliance by indication*



Compliance significantly varied by indication (p<0.001) being highest after body fluid exposure, 92%, 95% CI [86-96] and lowest after contact with patient surrounding, 32%,95% CI [25,40].

4.2.4. Compliance by Professional Cadre

Table 2: *Compliance by cadre*

Cadre	opportunities	Hand hygiene actions	Missed	Compliance	95% CI
Enrolled Midwife	263	137	126	52%	46-58
Registered Midwife	233	123	110	53%	46-59
Doctor	128	76	52	59%	51-68
	Pearson chi2(2) =2.005		p=0.367		

There was no statistically significant difference in compliance by cadre, p=0.367 although doctors demonstrated the highest compliance at 59% (95% CI: 51–68), followed by registered midwives at 53% (95% CI: 46–59). Enrolled midwives recorded the lowest compliance at 52% (95% CI: 46–58).

4.2.5. Compliance by Level of Facility

Table 3: *Compliance by level of facility*

Facility Level	opportunities	Hand hygiene actions	Missed	Compliance	95% CI
HCIV	119	50	69	42%	33-51
General Hospital	276	122	154	44%	38-50
Regional Referral Hospital	229	164	65	72%	65-77
	Pearson chi2(2) =46.124		p=0.000		

Health workers in Regional Referral Hospital demonstrated a significantly higher compliance rate of 72%, 95% CI [65-77], p<0.001, while those in Health centre IV had the lowest compliance of 42%, 95% CI [33,51].

4.2.6. Compliance by Facility Ownership

Table 4: *Compliance by facility ownership*

Facility Ownership	Number of Opportunities	Number of Hand Hygiene actions	Compliance	95% CI
Gov	516	291	56%	52-61
PNFP	108	45	42%	33-51
Diff			14%	4-24
p-value			0.005	

Public health facilities had a significantly higher compliance rate of 56%, 95% CI [52,61], p=0.005, compared to private-for-profit health facility with 42%, 95% CI [33,51]

4.2.7. Overall Availability of Handwashing and Handrub Facilities

Table 5: A*vailability of handwashing facilities and alcohol handrub*

Health facility	Functional handwashing facility available	Alcohol handrub available
Lira University Hospital	Yes	Yes
Amach HCIV	Yes	No
PAG Mission Hospital	Yes	Yes
Lira Regional Referral Hospital	Yes	Yes
Ogur HCIV	No	No
Ober HCIV	Yes	Yes

Overall, five out of six facilities (83%) had at least one functional handwashing facility in maternity ward, but only four out of six (66.7%) had alcohol-based hand rub available at point of care.

4.2.8. Availability of handwashing facilities and alcohol handrub in delivery and postnatal room

Table 6: *Handwashing and Handrub Access: Labour vs Postnatal rooms*

Health Facility	Functional Handwashing Facility Available		Alcohol handrub Available	
	Delivery room	Postnatal room	Delivery room	Postnatal room
Lira University Hospital	Yes	Yes	Yes	Yes
Amach HCIV	Yes	No	No	No
PAG Mission Hospital	Yes	No	No	Yes
Lira Regional Referral Hospital	Yes	Yes	Yes	Yes
Ogur HCIV	No	No	No	No
Ober HCIV	Yes	Yes	Yes	No

Five out of six (83%) health facilities had functional handwashing facilities in delivery rooms, but only three out of six (50%) had functional handwashing facilities in postnatal rooms. Alcohol handrub was available in only three out of six (50%) delivery rooms and also three out of six (50%) postnatal rooms.

4.2.9. Availability of Essential Hand Hygiene Standard Operating Procedures

Table 7: *Availability of hand hygiene standard operating procedures*

Health Facility	Handwashing technique poster displayed	Alcohol handrub technique poster displayed	Five moments of Hand Hygiene poster displayed
Lira University Hospital	Yes	Yes	Yes
Amach HCIV	No	No	No
PAG Mission Hospital	Yes	No	Yes
Lira Regional Referral Hospital	Yes	Yes	Yes
Ogur HCIV	Yes	No	Yes
Ober HCIV	Yes	Yes	Yes

Posters showing the Five Moments of Hand Hygiene were available in 83% of health facilities. Handwashing technique posters were also in 83%, while alcohol handrub technique posters were in 67%.

4.3. Qualitative Findings

4.3.1. Participant Characteristics

Data saturation was reached with a total of 12 key informants (healthcare workers) attached to maternity care units (Labour suite and Postnatal wards).
Most participants were female (67%), were registered midwives (58%) and from general hospitals (50%).

Table 8 : *Demographic characteristics of key informants*

Category	Frequency (n)	Percentage
Gender		
Male	4	33%
Female	8	67%
Cadre of the key informant		
Enrolled midwife	3	25%
Registered midwife	7	58%
Doctor	2	17%
Facility level		
Health canter IV	5	42%
General Hospital	6	50%
Regional Referral Hospital	1	8%

4.3.2. Presentation of Themes and Codes Generated in the Analysis

Thematic analysis yielded three main themes: reported practices and routine behaviour on hand hygiene, drivers of compliance to hand hygiene and participant recommendations for improvement. Under drivers of compliance to hand hygiene,

nine relevant codes were identified which were categorized into two subthemes: health system factors and individual/organizational factors in line with the conceptual framework (Table 9 and Appendix 1: Codebook).

4.3.3. Theme 1: Reported Practices and Routine Behaviour

Most participants reported that both hand washing and alcohol-based hand rub were being practiced. However, hand hygiene was not consistently done.

"In some procedures, no one bothers to do hand rub or hand wash, because they go straight to the woman and take blood pressure or palpate, then they wash afterwards"- P1, Enrolled Midwife, HCIV.

Some participants suggested that use of alcohol hand rub was easier and likely to lead to more compliance. The choice of handwashing or alcohol handrub was usually risk based, with handwashing done during higher risk procedures or when hands were visibly soiled. Alcohol handrub was mostly used during low-risk procedures.

"I think compliance with alcohol is more because it's easy … we usually have that alcohol distributed on the various trolleys, so it's quite easy. "If the hands are soiled, you have to specifically first use water, and soap, and you wash. But in an event where they are not soiled, you can even use the alcohol"- P9, Registered Midwife, General Hospital.

Health workers were also more likely to wash hands after rather than before a procedure, implying self-protection was prioritised over patient protection.

"If it's just vitals, and maybe going to listen to a foetal heart, you're monitoring labour, and at that point, you just have to check the descent or listen to the foetal heart, you may just go ahead and listen without washing hands, and then maybe, because now you want to stay clean and save yourself,

you wash after, but when you didn't wash before"-P12, Doctor, General Hospital.

4.3.4. Theme 2: Drivers of Compliance to Hand Hygiene

Nine relevant codes related to drivers of compliance to hand hygiene were identified (Table 9). These were further categorized into two subthemes: health system factors and individual/organizational factors. The health system factors included: availability of supplies, workload and staffing while individual/organizational factors included: knowledge and awareness, perceived risk and procedure type, reminders at workplace, monitoring and institutional support, being watched, attitude and beliefs, and hypersensitivity.

Table 9 : *Subthemes and relevant codes related to drivers of compliance*

Theme 2: Drivers of compliance			
Subtheme	**Relevant codes**	**Facilitators**	**Barriers**
Subtheme 1: **Health system factors**	Supplies Availability	Availability of water, soap, ABHR	Interruptions in water, soap and ABHR supply
	Workload and staffing		One health worker attending to multiple women, emergencies
Subtheme 2: **Individual/ organizational factors**	Knowledge and awareness	Knowledge of importance of hand hygiene and WHO's Five moments	Lack of refresher trainings, failure to remember all five moments
	Perceived Risk and Procedure type	Invasive, high-risk procedures	Non-invasive, low risk procedures, use of gloves to replace hand hygiene
	Reminders at workplace	Presence of reminders	Reminders not in all areas
	Monitoring and Institutional support	Management supportive in availing supplies	No monitoring and feedback systems for hand hygiene
	Being Watched	Presence of students, senior staff	
	Attitude and Beliefs		Poor attitude towards hand hygiene, Belief that hand hygiene should only be done when hands are dirty
	Hypersensitivity to hand hygiene material		Some health workers hypersensitive to soap and sanitizers

4.3.4.1. Subtheme 1: Health System Factors

The participants identified several structural and resource-based enablers or barriers to hand hygiene compliance including availability of supplies and staffing and workload challenges.

Supplies availability

The availability of essential hand hygiene supplies such as water, soap, and alcohol -based handrub emerged as a strong determinant of compliance. Participants noted that having these items readily accessible prompted them to perform hand hygiene more consistently.

> *"So, when you see an alcohol rub in your trolley you are reminded that you have to use it, you see a sink and soap and water flowing you are motivated to perform the hand hygiene"*- P1, Enrolled Midwife, HCIV.

Despite this, participants reported frequent stock out of soap and alcohol-based handrub and interruptions in water supply due to challenges such as broken taps and low water pressure especially at night.

> *"There is a sink, there is soap, and there is sanitizer, but of course, not all the time, because sometimes they are out of stock… and you need to wash hands, and then you just skip it"- P10, Enrolled Midwife, General Hospital.*

Sometimes those supplies were actually available in the facility stores but the access to these supplies was limited because the health workers do not request or the stores are locked, indicating lapses in personal responsibilities.

> *"Sometimes offices where sanitizers are picked are locked"*- P7, Enrolled Midwife, *General Hospital*.

These disruptions in availability of supplies discouraged regular hand hygiene and, in some cases, led to complete omission.

Work load and staffing

Understaffing and high patient numbers reduced time and opportunity for proper hand hygiene. Participants mentioned situations where one midwife was attending to several mothers in labour. Being alone on duty and managing multiple mothers in labour created pressure that compromised compliance.

"There is [sic] few staff which are not in ratio with the patient's number"- P3, Registered Midwife, HCIV.

"Just imagine you have three deliveries in a row and you have repairs in between … you cannot wash your hands."- P7, Enrolled Midwife*, General Hospital.*

Participants also highlighted that hand hygiene was often omitted during emergencies to save time.

"If it's an emergency, they say act fast or quick. You find we don't follow the hand washing steps"- P2, Registered Midwife, General Hospital.

4.3.4.2. Subtheme 2: Individual/Organizational Factors

Under this subtheme, participants identified knowledge, behavioural, perceptual, and institutional drivers of compliance.

Knowledge and awareness

Participants attributed the compliance to hand hygiene to the knowledge of the guidelines. Most participants were aware of the importance of hand hygiene in preventing infection and the WHO's "Five Moments of Hand Hygiene", although some struggled to recall all five moments. The presence or absence of training was seen as a significant contributor to compliance. While a few participants had

received prior in-service training or mentorship, others reported relying solely on pre-service training from their time in school. For many, the lack of regular trainings or CMEs was a major barrier.

"We were trained once." – P10, Enrolled Midwife, General Hospital

"I don't remember receiving a training here"– P9, Registered Midwife, General Hospital.

"I think the officials in the hospital believe as a health worker, before you join in the health profession, maybe while at school, they are taught how to do these things"– P5, Registered Midwife, HCIV.

Reminders at workplace

Presence of visual aids such as the five moments of hand hygiene, hand washing technique and alcohol handrub technique wall charts reinforced knowledge. However, participants expressed that these alone were insufficient to ensure consistent adherence.

"The guidelines are there, but it is not in all corners where we do wash hands"- P6, Registered Midwife, HCIV.

"T*hey think people will follow the charts as they do the hand hygiene". - P10, Enrolled Midwife, General Hospital.*

Participants recommended increasing the strategic placement of such reminders to improve their visibility and practical utility. They also recommended that the staffs are frequently taken through these charts to ensure they understand.

Perceived risk and procedure type

Compliance was closely tied to the perceived risk of infection associated with different procedures. High-risk or visibly "dirty" procedures such as deliveries or vaginal examinations were more likely to trigger hand hygiene performance

compared to low-risk tasks like taking vital signs, administering medication, or supporting breastfeeding.

"*The major one that you really see people wash hands is delivery, where you see there's blood, … they're going to wash*"- P4, Registered Midwife, Regional Referral Hospital.

"After doing an abdominal examination, they rarely think about washing their hands. Even cannulating or maybe taking a blood pressure, it's rare that one thinks about using soap and water to wash their hands" - P5, Registered Midwife, HCIV.

Additionally, gloves were most often misused as a substitute for hand hygiene, especially in low risk or routine procedures.

"I have seen in some cases some people put on gloves already, disposable gloves. Then they just add the surgical gloves on top. So that when they go to the next procedure, they just remove the outer gloves and again put another glove on top"- P1, Enrolled Midwife, HCIV.

Monitoring and institutional support

Formal monitoring systems such as audits and checklists were largely absent and hand hygiene was rarely formally evaluated or documented. While management was commended for providing supplies and maintaining infrastructure where possible, there was limited follow-up on compliance or evaluation of hand hygiene practices.

"The management try by putting in place all the things you need, the soap, make sure the cleaner brings in water every day, and provided all those handwashing facilities plus the sanitizer in different wards and in different corners"- P3, Registered Midwife, HCIV.

"I haven't seen any monitoring or evaluation specific to hand hygiene, in our facility"-P12, Doctor, General Hospital.

Some participants noted occasional discussions about hand hygiene in staff meetings, but lacked enforcement.

Being watched by others

Several participants described performing hand hygiene when being watched by others such as a student, supervisor or senior staff. In such moments, hand hygiene was more about role modelling or presenting best behaviour rather than usual practice.

'If a senior is around, … you really try as much as you can to be at your best" - P5, Registered Midwife, HCIV.

"Here we are teachers and we are used to emphasizing this to our learners that they should wash hands. So, you find it's just part of your [routine], because of the responsibility you have"- P9, Registered Midwife*, General Hospital.*

Attitudes and beliefs

Some participants reported that poor attitudes and underestimation of infection risk led to lapses. Some health workers believed that if they haven't touched anything "dirty," hand hygiene is unnecessary. Some believed hand hygiene would delay them from completing their tasks.

"I can say an attitude ... They don't find it important to wash hands. They feel like washing hands is just like a delay for them"- P6, Registered Midwife, HCIV.

Hypersensitivity to hand hygiene materials

Although less commonly mentioned, some participants shared that, allergic reactions to soaps or alcohol-based handrub discouraged them from performing hand hygiene.

"You find that … people also reacting on the detergent, that's why they say, ah, I will not wash my hands, because I react to this detergent"- P10, Enrolled Midwife*, General Hospital*.

4.3.5. Theme 3: Participant recommendations for improvement

Participants provided several practical suggestions to strengthen hand hygiene (HH) practices within their health facilities. These recommendations focused on both systemic improvements and behavioural motivators:

Enhance training and mentorship opportunities

Many participants emphasized the need for regular learning sessions including continuous medical education (CME), refresher trainings, and on-site mentorships specifically tailored to hand hygiene. These were seen as essential for reinforcing knowledge and skills, especially in the face of staff changes.

"… there should be CMEs, something like that, which should be a must for all staffs, especially the maternity staffs so that some of these things are discussed"- P4, Registered Midwife, Regional Referral Hospital.

Strengthen monitoring and supervision

Participants suggested more consistent and supportive supervision to reinforce adherence to hand hygiene protocols. This included routine checks, feedback mechanisms, and constructive engagement by supervisors.

"I think management should find ways of trying to put the quality check, or checks and balances that can make us accountable"- P1, Enrolled Midwife, HCIV

Ensure consistent availability of hang hygiene supplies

There was a strong call for uninterrupted access to key hand hygiene supplies: water, soap, and alcohol-based hand rub (ABHR). Specific suggestions included increasing the number of functional hand hygiene stations, timely repair of broken water systems, installation of alternative water sources and provision of portable ABHR dispensers.

> *"[Management] should look into that, that all the requirements needed for handwashing is available at all moments, and at every point, entrance or at a point that you expect someone to be doing the hand washing".* - P2, Registered Midwife*, General Hospital.*

Increase visibility of reminders and SOPs

Participants recommended the strategic placement of hand hygiene reminders and standard operating procedures (SOPs) such as the five moments of hand hygiene, handwashing and alcohol handrub technique charts throughout the wards to prompt consistent practice.

> *"… I believe strategically putting the SOPs, can motivate or remind someone to comply with hand hygiene practices"*-P12. Doctor, General Hospital

Improve staffing levels

High patient volumes and limited staff numbers were cited as barriers to hand hygiene. Participants recommended increasing the workforce to reduce the workload and enable more consistent practice of hand hygiene.

> *"… having more staff would reduce the work and it would give you time to prepare adequately"*- P3, Registered Midwife HCIV.

Introduce recognition and incentives

Some participants proposed introducing recognition mechanisms, such as awards or

public acknowledgment, for staff who consistently adhere to hand hygiene guidelines. This was seen as a way to reinforce positive behaviour.

> *"If they're putting rewards and recognition in every facility, … that every person who is observed and [those] who adhere to handwashing is awarded, I think people will practice this thing because everyone would want to be recognized".* - P3, Registered Midwife, HCIV.

Engage staff in planning and decision-making

Lastly, participants highlighted the importance of involving frontline staff in the planning and distribution of hand hygiene materials. This participatory approach was viewed as a way to ensure relevance, increase accountability, and foster ownership of infection prevention initiatives.

"… the most important thing is to involve them in the process of hand-washing. You cannot just bring … a hand-washing drum, put it there and say, you people are going to wash hands there. They will not wash. Maybe they don't like the smell of the soap you procure as a hospital. If you involve them, that would be good". - P7, Enrolled Midwife*, General Hospital.*

Chapter 5: Discussion

1.1 Introduction

This study set out to assess the level of compliance with hand hygiene practices among healthcare workers in maternity wards within Comprehensive Emergency Obstetric and Newborn Care (CEmONC) facilities in Lira City and Lira District, Uganda. The study also assessed the availability of hand hygiene materials and drivers of compliance to hand hygiene. This chapter presents an integrated discussion of the findings from both the quantitative and qualitative strands of this mixed methods study.

5.1. Summary of the Findings

Table 10 : *Summary of quantitative and qualitative findings*

Objective	Quantitative Findings	Qualitative Insights
Assess compliance to hand hygiene	54% overall compliance, highest after body fluid exposure.	Compliance higher in high-risk tasks; driven by risk perception
Determine availability of hand hygiene facilities	83% had handwashing facilities; 67% had alcohol handrub	Supplies sometimes out of stock or not accessible
Explore drivers of compliance	Higher compliance in better-resourced, public facilities	Influenced by knowledge and training, availability of supplies, risk perception, attitude, monitoring and institutional support, reminders, workload and staffing

5.2. Interpretation of Key findings

5.2.1. Compliance to Hand Hygiene

The findings revealed that hand hygiene compliance among healthcare workers (HCWs) in maternity wards of CEmONC facilities in Lira city and Lira district stands at 54%, which is suboptimal compared to the WHO recommendation of more than 90% (Pittet & Donaldson, 2005; World Health Organization, 2009c). This level of compliance is much higher than the 39% global picture (World Health Organization, 2016b) but only slightly higher than the 52% reported in the Mulago study (Komuhangi et al., 2019). This demonstrates some progress in improving hand hygiene but highlights persistent challenges in adhering to recommended hand hygiene practices.

Compliance significantly varied by indication ($p<0.001$), being highest after exposure to body fluids (92%), which is consistent with other studies where self-protection was a strong motivator for hand hygiene (Smiddy et al., 2015). Compliance before aseptic procedures (70%) was relatively high, likely due to ingrained clinical practices. However, low compliance before patient contact (39%) and after contact with patient surroundings (32%) indicates that risks less visible to healthcare workers are undervalued. The qualitative findings provided context to these results: Health workers emphasized that compliance was more likely during procedures perceived to be high-risk, such as deliveries or exposure to blood. This is also consistent with Health Belief Model's risk perception construct. On the other hand, routine tasks like measuring blood pressure or touching the patient environment were considered low-risk and often bypassed hand hygiene, consistent with lower compliance rates observed quantitatively before patient contact and after contact with patient surrounding. From a Health Belief Model

(HBM) perspective, this pattern reflects a stronger perception of personal susceptibility and severity during high-risk situations (e.g., exposure to blood), where workers prioritize self-protection. Conversely, low compliance in routine or less visibly risky situations suggests perceived low susceptibility and benefits in those situations. These findings also agreed with a study done in Kathmandu, Nepal which showed that hand hygiene was most likely to be done after body fluid exposure and least likely after contact with patient surrounding (Duwal et al., 2024).

A breakdown by professional cadre showed no significant difference between cadres P=0.367, although doctors had higher compliance (59%), followed by registered midwives (53%) and enrolled midwives (52%). These relatively small differences suggest systemic factors may play a more significant role in influencing hand hygiene behaviour than professional training alone. These findings also contrast one systematic review which showed that nurses in ICU had better compliance than physicians (43.4% Vs 32.6%) (Lambe et al., 2019).

Compliance also varied significantly by health facility level ($p<0.001$) and ownership ($p=0.005$). Regional referral hospital had the highest compliance (72%) compared to only 42% in Health Centre IVs. These differences were possibly due to a combination of better staffing (higher staff numbers and higher level of training) and better infrastructure, and resource availability. This was also evident during participant interviews where availability of hand hygiene supplies and water was a strong driver of compliance. According to Theory of Planned Behaviour (TPB), limited supplies reduce perceived behavioural control, while under the HBM, these shortages increase perceived barriers, both of which discourage consistent compliance.

Government health facilities had significantly better compliance than Private-not-for-profit facilities (56% vs. 42%, p=0.005), which may be attributed to stronger enforcement of national protocols or better integration with Ministry of Health initiatives. These findings were similar to those of a study done among healthcare workers in Kampala City during COVID-19 pandemic, in which government health facilities had better hand hygiene compliance compared to PNFP health facilities (78% vs 50%) (Limenyande et al., 2023).

These findings demonstrate that hand hygiene compliance is selectively practiced, guided by risk perception rather than strict adherence to WHO's five moments.

5.2.2. Availability of Hand Hygiene Materials

Availability of essential hand hygiene infrastructure was also uneven. While 83% of health facilities had at least one functional handwashing facility, only 67% had alcohol-based hand rub (ABHR) available at the point of care. Major gaps were especially evident in postnatal rooms, where functioning hand-washing facilities and alcohol-based handrubs were available in only half of the health facilities. Standard operating procedures and visual reminders were present in most facilities, but still incomplete, particularly for alcohol handrub techniques (missing in 33% of facilities). Although essential hand hygiene supplies were available in most of the health facilities, qualitative findings showed that these supplies were not consistently available especially at night and when they run out of stock. These findings show significant improvement compared to the 2015 WHO report which revealed 62% availability of water and less than two thirds of facilities having soap and water or alcohol-based handrubs (World Health Organization, 2015a).

5.2.3. Drivers of Compliance to Hand Hygiene Among Health Workers

Participants identified several key drivers of compliance which included both health system factors (availability of supplies, workload and staffing) and individual/organizational factors (knowledge and awareness, perceived risk and procedure type, reminders at workplace, monitoring and institutional support, being watched, attitude and beliefs, and hypersensitivity to hand hygiene materials). Knowledge and awareness and availability of supplies emerged as key factors. Most health workers recognized the importance of hand hygiene in preventing infections and were generally familiar with the WHO's "five moments" of hand hygiene. However, not all could recall each moment accurately. The presence or absence of training significantly influenced compliance, with some participants citing prior in-service training or mentorship, while others relied solely on what they had learned during pre-service education. These findings were consistent with previous studies which also cited knowledge as an influence on compliance (Antinozzi et al., 2023). Many participants expressed concerns about the lack of regular refresher trainings or continuing medical education (CME), which they felt hindered sustained hand hygiene practice. Education of frontline health care workers using practical, hands-on approach has been shown to improve hand hygiene compliance and lower incidence of HCAIs (World Health Organization, 2016a).

The availability of hand hygiene supplies was frequently mentioned as a critical determinant of compliance. When water, soap, and alcohol-based hand rubs are available, participants reported being more likely to perform hand hygiene. But, frequent stock-outs of soap and alcohol handrub, along with inconsistent water supply due to issues like broken taps and low pressure during the night were cited

as recurring challenges. In some cases, supplies were present in facility stores but remained inaccessible due to locked stores or health workers failing to collect them, highlighting gaps in both system and individual responsibility. These disruptions discouraged regular hand hygiene and sometimes resulted in completely omitting hand hygiene. A cross-sectional study in Nigeria also cited unavailability of water and soap as the main reasons for poor hand hygiene (Global Hand Washing Partnership, 2018).

Visual reminders at the workplace, such as wall charts illustrating hand washing techniques and the “five moments of hand hygiene”, were noted to reinforce compliance. This was also consistent with other studies which showed that an environment with more reminders was associated with more hand rubbing/washing (Gon, Virgo, et al., 2020). However, participants emphasized that these alone were insufficient to ensure consistent adherence. They suggested that the strategic placement of such materials be improved to enhance visibility. In addition, they recommended that staff should be periodically guided through these charts to reinforce understanding and correct application.

The perceived risk of infection associated with some procedures also influenced compliance. Participants were more likely to perform hand hygiene before and after high-risk or visibly “dirty” procedures, such as deliveries or vaginal examinations. In contrast, tasks perceived as low-risk, like administering medication, taking vital signs, or assisting with breastfeeding were less likely to prompt hand hygiene. These findings re-enforce previous studies in which self-protection was a strong motivator for hand hygiene (Smiddy et al., 2015). A common misuse noted by participants was the use of gloves as a substitute for hand hygiene, particularly during routine or low-risk activities.

Monitoring and institutional support were also identified as drivers of compliance. Most participants indicated the absence of formal systems to monitor hand hygiene, such as audits or checklists. While management was acknowledged for efforts in providing supplies and maintaining infrastructure, there was little emphasis on follow-up, compliance enforcement, or formal evaluation of hygiene practices. Some staff meetings briefly touched on hand hygiene, but without any sustained enforcement. Routine monitoring and involvement of senior managers in hand hygiene initiatives is strongly emphasized in the WHO multimodal strategy for hand hygiene (World Health Organization, 2009a).

Workload and staffing levels also played a critical role. Many participants described situations where they were the only midwife on duty managing several women in labour, which significantly limited their ability to perform hand hygiene properly. This was consistent with other studies where workload was identified as a barrier to hand hygiene (Ahmadipour et al., 2022). In addition, hand hygiene was often skipped during emergencies in order to save time, further compromising adherence.

A number of participants admitted that being watched by others, such as students, supervisors, or senior colleagues, prompted them to perform hand hygiene more diligently. In these instances, compliance was driven more by a desire to role model or present proper conduct than by routine habit. Role modelling is also a WHO recommended strategy to improve hand hygiene (World Health Organization, 2009a).

Underlying attitudes and beliefs additionally influenced behaviour. Some participants believed that if they hadn’t touched anything visibly contaminated, then hand hygiene was unnecessary. Such misconceptions led to lapses, especially

when coupled with poor attitudes towards hand hygiene. One previous study also identified inappropriate attitude as a barrier to hand hygiene compliance (Ahmadipour et al., 2022).

Finally, a few participants mentioned being hypersensitive to hand hygiene materials such as soaps or alcohol-based hand rubs. Although less frequently cited, these allergic reactions were noted as discouraging factors for consistent hand hygiene. According to the world health organization, frequent and repeated use of hand hygiene products, particularly soaps and other detergents, is an important cause of chronic irritant contact dermatitis among healthcare workers (World Health Organization, 2009c).

Collectively, qualitative findings reinforced the theoretical interpretations. Healthcare workers reported that compliance was more likely during visibly “dirty” or high-risk procedures, consistent with HBM’s risk perception construct. Workload and understaffing limited opportunities for compliance, highlighting TPB’s perceived control and HBMs perceived barriers. Attitudes and beliefs such as perceiving hand hygiene as unnecessary when hands “look clean” demonstrate the influence TPB’s attitude component. Cues to action, including reminders, posters, and supervision, acted as motivators but were inconsistently available.

5.3. Implications for Practice

Immediate interventions, such as ensuring constant access to water, soap and alcohol-based hand rub (ABHR) are urgently needed especially in lower health facilities. Particular attention should be placed on postnatal rooms where risk of infection is often under estimated, and therefore under-resourced compared to delivery rooms. On-the-job refresher training, continuous medical education (CMEs) may help enhance compliance. Additionally, policy attention is required at

both district and national levels to formally integrate hand hygiene into routine monitoring and support supervision checklists.

5.4. Study limitations

The study did not evaluate compliance with recommended hand hygiene techniques. While compliance with the timing of hand hygiene was observed, the study did not evaluate whether handwashing or use of alcohol-based hand rub was performed according to recommended techniques. This limits the understanding of whether observed practices were effective in preventing infections and may overestimate actual protection provided by hand hygiene.

Another potential limitation of this study is the Hawthorne effect, where healthcare workers may have improved their hand hygiene practices simply because they were being observed, potentially leading to an overestimation of compliance. To minimize this, observers informed health workers that they were observing medical procedures in general, without specifying that hand hygiene was the focus.

5.5. Contribution of the Study

This study contributes to the body of knowledge on infection prevention by providing an assessment of hand hygiene compliance across all five WHO-recommended moments in maternity wards of Lira City and Lira District. Unlike previous studies in Uganda that focused on general healthcare settings or assessed only some of the five moments of hand hygiene, this study generates context-specific evidence from maternity wards, where both mothers and newborns are highly vulnerable to infection

Chapter 6: Conclusions and Recommendations

6.1. Conclusions

- The findings revealed that overall compliance with hand hygiene practices was suboptimal, with only 54% of hand hygiene opportunities being followed by appropriate action compared to WHO recommendation of more than 90%.
- Compliance significantly varied across facility levels, facility ownership and specific indications, with the highest compliance occurring after body fluid exposure and the lowest after contact with patient surroundings.
- Resource availability differed across facilities, with functional handwashing facilities and alcohol-based hand rub not consistently present in all maternity wards, particularly in postnatal rooms.
- While most facilities displayed standard operating procedures and promotional materials for hand hygiene, gaps remained, especially regarding alcohol handrub techniques poster.
- The drivers of compliance to hand hygiene varied from systems factors to individual and organizational factors. Individual factors included: supplies availability, workload and staffing; while individual and organizational factors included: knowledge and awareness, perceived risk and procedure type, reminders at workplace, monitoring and institutional support, being watched, attitude and beliefs and hypersensitivity to hand hygiene materials.

6.2. Recommendations

Based on the findings of this study, the following recommendations are proposed to enhance hand hygiene compliance among healthcare workers in maternity wards:

1. Health facility managers should ensure uninterrupted access to clean water, soap, and alcohol-based hand rubs in all maternity wards, with a special focus on postnatal care rooms and lower health facilities.
2. Ministry of Health and District Health Officers should implement regular in-service hand hygiene training sessions in all facilities to close knowledge gaps. This can be done using a combination of refresher trainings, peer lead continuous medical education (CMEs), coaching and mentorship.
3. Monitoring and accountability should be strengthened at all levels. Facility managers should put in place routine hand hygiene compliance monitoring with feedback mechanisms at the facility level. Compliance data should also be integrated into performance assessments and support supervision by Ministry of Health and District Health Office.
4. Facility managers should improve ensure visibility and Coverage of Hand Hygiene Standard Operating Procedures (SOPs) is improved. All maternity wards should be equipped with prominently displayed, standardized SOP posters. These should include guidance on the five moments for hand hygiene, proper handwashing techniques, and the use of alcohol-based handrub.
5. Workload issues should be addressed by Ministry of Health and District local governments by ensuring adequate staffing in maternity wards to

reduce workload pressure and support better adherence to infection prevention practices.

6. More research is needed to establish whether health workers follow the recommended hand washing and alcohol handrub techniques while performing hand hygiene.

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Appendices

Appendix 1: Codebook

- **Current Practice**
  - Both Handwashing and AHR are practiced
  - HH is done, but not always
  - Sometimes HH is not done correctly
  - HH is done more frequently for some procedures
  - HH done after procedure but not before
  - Sometimes ABHR is preferred due to ease of use
  - Choice of Handwashing or ABHR is Risk based
  - Use washing or ABHR interchangeably
- **Facilitators/Motivators**
  - **Health System Factors**
    - **Supplies Availability**
      - Availability of suppies such as AHR, Water, Soap
      - Availability of HWF in ward
      - Sanitizers make HH easier
  - **Individual and Organizational Factors**
    - **Knowledge and awareness**
      - Protocols are available
      - I am aware of importance of HH
      - I am Familiar with 5 moments
      - We were trained on HH
      - Internal CMEs done on HH
      - I am familiar with HH technique
    - **Reminders at workplace**
      - Five moments of HH poster available
      - How to wash hands poster available
    - **Perceived Risk and Procedure type**
      - Fear of risk of infection
      - HH done for procedures considered risky
      - HH only done when hands are dirty
      - Some staff prioritise self protection
    - **Adequate monitoring and supervision**
      - Management supports to ensure supplies are there
      - We give our selves internal feedback
      - Management is supportive of HH
      - HH is emphasized in meetings
      - Sometimes HH is assessed during supervision
      - Punitive measures exist for non-compliance
    - **Being watched by others**
      - Presence of students
      - Trying to be an example to others
      - I try to be at my best when seniors are around
- **Barriers**
  - **System Factors**
    - **Inadequate supplies**
      - Shortage of water
      - Shortage of soap or ABHR
      - Sometimes ABHR or soap is locked in store
      - Sometimes HW facility is faulty
      - Few Handwashing stations
    - **Work Load and Staffing**
      - Few health workers
      - Emergencies make HH not possible
      - Heavy workload
  - **Individual/Organizational Factors**
    - **Inadequate Knowledge/Awarenes**
      - We have never had training/CMEs on HH
      - I donot Remember all the 5 moments
      - We were trained once
      - Its assumed people will follow the charts
      - Trainings not done frequently
      - Some don't know how to do it well
      - It is assumed HH was taught at school
      - Lack of knowledge
    - **Inadequate monitoring and supervision**
      - No monitoring of HH
      - No one comes to check
      - None enforces HH
      - No feedback mechanism on HH
      - No motivation from management
    - **Perceived Low Risk**
      - Sometimes glove use replaces HH
      - No HH for non-contact procedures
      - Some procdures are perceived low risk
      - People have relaxed since no outbreak
    - **Lack of Reminders at work place**
      - The reminders are not in all areas
    - **Attitude and Beliefs**
      - Poor attitude of HWs
      - HH perceived as time wasting
      - Lack of self motivation
    - **Adverse reactions to HH material**
      - Some people react on sanitizer
      - Some people react on detergents
- **Suggestions for Improvement**
  - Regular training/CMEs/mentorships on HH
  - Improve monitoring/Supervision
  - Ensure Constant availability of Water, soap, ABHR
  - Avail reminders/SOPs in the ward
  - Improve staffing
  - Recognition/Rewards for complying staff
  - Involve staff in planning for HH materials

Appendix 2: Hand Hygiene Observation Form

District:		**Facility Name:**		**Level of facility (Tick):**	Regional Referral Hosp	General Hosp	HCIV
Ownership (Tick)	Gov	PNFP	PFP	**Observer: (initials)**		Date:	
Cadre		Gender		**ID No**		**Start Time**	**End Time**

Opp	Indication	HH Action	Opp	Indication	HH Action	Opp	Indication	HH Action	Opp	Indication	HH Action
1	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**2**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**3**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**4**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ *missed*
5	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**6**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**7**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**8**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed
9	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**10**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**11**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**12**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed
13	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**14**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**15**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed	**16**	☐ bef-pat. ☐ bef-asept. ☐ aft-b.f. ☐ aft-pat. ☐ aft.p.surr.	☐ HR ☐ HW ☹ missed

Key:
bef-pat-before patient contact, **bef-asept**-before aseptic procedure. **aft-b.f**-after contact with body fluids **, aft-pat**-after patient contact, **aft-p.surr**-after contact with patient surrounding, **HR-**Alcohol Handrub done, **HW-**handwashing done
Adapted from WHO Hand Hygiene Observation form (World Health Organization, 2009b)

Key:
bef-pat-before patient contact, **bef-asept**-before aseptic procedure. **aft-b.f**-after contact with body fluids **, aft-pat**-after patient contact, **aft-p.surr**-after contact with patient surrounding, **HR-**Alcohol Handrub done, **HW-**handwashing done
Adapted from WHO Hand Hygiene Observation form (World Health Organization, 2009b)

Appendix 3: Checklist for Availability of Handwashing Facilities and ABHR

1. Date:		2. District:	
3. Facility:		4. Facility Level:	
5. Ownership **(Tick)**	Gov:	PNFP:	PFP:

Delivery Room

6. Cadre of Health worker interacted with:
7. Number of health-care workers on this ward: Students: Enrolled MW: Registered MW: Doctors:
8. Is the hand washing facility/Sink available? ☐ Yes ☐ No
9. Does the handwashing facility/sink have running water? ☐ Yes ☐ No
10. Is soap available at the sinks? ☐ Yes ☐ No
11. Is an alcohol-based handrub available? ☐ Yes ☐ No
12. Which type of Alcohol based hand rub is available?

☐ Dispenser attached to trolly ☐ Dispenser attached to wall ☐ Pocket handrub

13. Are posters illustrating handwash technique displayed beside each sink? ☐ Yes ☐ No
14. Are posters illustrating handrub technique displayed close to the dispensers and in multiple areas of the ward? ☐ Yes ☐ No
15. Are posters illustrating indications for hand hygiene displayed in multiple areas of the ward? ☐ Yes ☐ No

Postnatal Room/Ward

16. Cadre of Health worker interacted with:
17. Number of health-care workers on this ward: Students: Enrolled MW: Registered MW: Doctors:
18. Is the hand washing facility/Sink available? ☐ Yes ☐ No
19. Does the handwashing facility/sink have running water? ☐ Yes ☐ No
20. Is soap available at the sinks? ☐ Yes ☐ No
21. Is an alcohol-based handrub available? ☐ Yes ☐ No

22. Which type of Alcohol based hand rub is available?

☐ Dispenser attached to trolly ☐ Dispenser attached to wall ☐ Pocket handrub

23. Are posters illustrating handwash technique displayed beside each sink? ☐ Yes ☐ No

24. Are posters illustrating handrub technique displayed close to the dispensers and in multiple areas of the ward? ☐ Yes ☐ No

25. Are posters illustrating indications for hand hygiene displayed in multiple areas of the ward? ☐ Yes ☐ No

Adapted from WHO Ward Infrastructure Survey Form (World Health Organization, 2009b)

Appendix 4: Key Informants Interview Guide

Title	Compliance to hand hygiene among healthcare workers in maternity wards in comprehensive emergency, obstetric and new-born care health facilities in Lira City and Lira District, Uganda
Introduction	My name is…… I am the research assistant tasked with collecting information for the above-titled study. You were selected to participate in this study because you are a health worker involved in Maternity care to women and your ability to express yourself will enable us find quality data. During our conversation, I will ask you open questions and you will narrate to me your answers. In case you want to stop talking during our conversation because of any reason, feel free to do so. All the information you share with me will be anonymous & confidential. Your feedback will contribute to improving hand hygiene compliance and quality of care in maternity wards.
Respondent ID	
Date of interview	
Socio-demographic characteristics	1) Could you please tell me more about yourself? (Your cadre, education, role, and years of experience working in this facility? What are your main responsibilities in the maternity ward?)
Discussion guide	Probes

Knowledge and Awareness of Hand Hygiene	1. How familiar are you with hand hygiene guidelines and protocols in maternity wards? 2. In what situations is hand hygiene recommended in your facility? Are there any specific practices for different stages (e.g., pre-delivery, delivery, post-delivery)? 3. How often are healthcare workers trained or retrained on hand hygiene practices in your facility? 4. In your opinion, how important is hand hygiene in preventing infections in maternity wards?
Current Hand Hygiene Practices	1. Can you describe the current hand hygiene practices observed among healthcare workers in the maternity ward? 2. How often do healthcare workers comply with these practices during? • Patient examinations? • Procedures such as delivery? • Other routine activities (e.g., handling medical equipment, assisting with breastfeeding)? 3. Are there specific situations where hand hygiene practices are often missed or skipped? If so, what are these situations?
Factors Influencing Compliance	1. What are the main challenges healthcare workers face in complying with hand hygiene practices? 2. Are there sufficient hand hygiene resources available in the maternity ward (e.g., sinks, soap, hand sanitizer)?

	3. How does the workload or staffing level affect compliance with hand hygiene? 4. Are there any cultural or behavioural factors that influence hand hygiene compliance among healthcare workers in maternity wards? 5. Do healthcare workers feel motivated or encouraged by the facility's management to adhere to hand hygiene practices?
Monitoring and Enforcement of Hand Hygiene Practices	1. How are hand hygiene practices monitored in your facility? 2. Is there any feedback mechanism or system in place for healthcare workers regarding their hand hygiene compliance? 3. What are the consequences (if any) for healthcare workers who do not comply with hand hygiene protocols? 4. Does the management support or incentivize compliance with hand hygiene practices? If so, how?
Suggestions for Improvement	1. What changes or improvements do you think are needed to enhance compliance with hand hygiene practices in the maternity ward? 2. How could the facility management support healthcare workers more effectively to adhere to hand hygiene guidelines? 3. Are there any additional resources or training programs that would be helpful to ensure compliance?
Closure	Thank you for the information, your time and valuable insights on hand hygiene. Is there any additional comments or suggestions related to hand hygiene practices in maternity units?

	We will be happy to share with you a copy of the result, if you are interested. Thank you for your time and participation in the study, God bless you!

Appendix 5: Consent Form

Principal Investigator: Rotich Leonard

Dear Participant,

You are invited to participate in a research study conducted by Rotich Leonard at your health facility which aims to observe various healthcare procedures in order to better understand clinical practices and improve patient care.

This is a postgraduate student led research which is self-sponsored for the purpose of award of Master's degree in public health of Uganda Christian University

Study Procedures: As a participant in this study, you will be observed while performing your routine healthcare procedures. These procedures may include but are not limited to patient assessments, medical interventions and interactions with patients. You may also be selected to participate in an interview after the end of the observation period.

Duration of Participation: Your participation in this study will involve being observed during your regular shifts over a period of 30 minutes

Potential Risks and Benefits: There are no anticipated risks associated with your participation in this study. However, your participation may contribute to the advancement of medical knowledge and potentially lead to improvements in healthcare practices, which could benefit both healthcare workers and patients.

Confidentiality: Your privacy and confidentiality will be strictly maintained throughout the study. All data collected will be anonymized and stored securely in a password protected computer. All hardcopies of data will be stored in a lockable cabinet which will be restricted to only the research team.

Compensation. You will be compensated for your participation with a refreshment of Ugx 5,000. You have the right to withdraw at any time without any penalty or loss of benefits.

Contact Information: If you have any questions or concerns about the study, you can contact Rotich Leonard on Tel: 0777059943, email: rotichleo256@gmail.com and Uganda Christian University Research and Ethics Committee.

By signing below, you acknowledge that you have read and understood the information provided in this consent form and voluntarily agree to participate in the study.

Participant Signature: _____ Date: _____

Researcher Signature: _____ Date: _____

You are free to ask for a copy of this form for your records.

Thank you for considering participation in this study.

Appendix 6: Timelines/Gantt Chart

ACTIVITY	PERIODS													
	May-2024	Jun-2024	Jul-2024	Aug-2024	Sep-2024	Oct-2024	Nov-2024	Dec-2024	Jan-2025	Feb-2025	Mar-2025	Apr-2025	May-2025	Jun-2025
Concept Development														
Proposal writing														
Develop Research tools														
Obtain REC approval														
Data Collection														
Data analysis and Report writing														
Report Submission														

Appendix 6: Budget

Item Description	Quantity	Rate (Ugx)	Frequency	Total (Ugx)	Comments
Participant Compensation	52	5,000	1	260,000	
Quantitative Research Assistants	6	250,000	3	4,500,000	
Qualitative Research Assistant	1	1,000,000	1	1,000,000	
Printing and photocopying Research tools	800	500	1	400,000	
Printing proposal	150	500	1	75,000	3 copies*50 pages
Binding Proposal	3	3,000	1	9,000	Spiral
Printing draft research report	300	500	1	150,000	3 copies*100 pages
Binding Draft Report	3	5,000	1	15,000	3 copies *100 Pages spiral
Printing and binding final research report	4	15,000	1	60,000	
Binding Final Research Report	4	25,000	1	100,000	3 copies *100 Pages Hardcover
Travel	10	15,000	2	300,000	
Airtime	1	50,000	15	750,000	
Internet Bundles	1	50,000	15	750,000	
Data Analysis	1	1,000,000	1	1,000,000	
Dissemination of Findings	1	1,000,000	3	3,000,000	
Contingency	1	3,000,000	1	3,000,000	
Total				**15,369,000**	

Appendix 7: Approvals

UGANDA CHRISTIAN UNIVERSITY
A Centre of Excellence in the Heart of Africa

Office of the Vice Chancellor
Research Ethics Committee UG-026

03rd February, 2025

LEONARD ROTICH
Uganda Christian University
Email: rotichleo256@gmail.com

UG-REC-026 APPROVAL NOTICE

To: Leonard Rotich, Principal Investigator

Re: UCU-REC Application titled: *Compliance To Hand Hygiene Among Healthcare Workers In Maternity Wards In Comprehensive Emergency, Obstetric And New-Born Care Health Facilities In Lira City And Lira, District, Uganda.*
Application Number: **UCUREC-2025-787**

Version: 4.1
Type: [ ] **INITIAL REVIEW**
[ ] Protocol Amendment
[ ] Letter of Amendment (Loa)
[ ] Continuing Review
[ ] Material Transfer Agreement
[ ] Other, Specify:

UGANDA CHRISTIAN UNIVERSITY
APPROVED
!INTI!
03 FEB 2026
RESEARCH ETHICS COMMITTEE

I am pleased to inform you that the **UG-REC-026;** UCUREC approved the above referenced application.
Approval of the research is for the period from **03rd February, 2025,** to **03rd February, 2026**
This research is considered minimal risk category.
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and additions to the protocol or the consent form must be submitted to the REC for re-review and approval **prior** to the activation of the changes. The REC application number assigned to the research should be cited in any correspondence.
3. Reports of unanticipated problems involving risks to participants or other must be submitted to the REC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for REC review.

P.O. Box 4, Mukono, Uganda, Plot 67-173, Bishop Tucker Road, Mukono Hill
Tel: +256 (0) 312 350 885 Fax: +256 (0) 4142 90 800 Email: rec@ucu.ac.ug Web: www.ucu.ac.ug
UCUREC is accredited by Uganda National Council for Science & Technology, FDA, and National Institutes for Health of the United States of America

4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date of 03rd February, 2026 in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. Your research details have been shared with the Executive secretary of Uganda National Council for Science and Technology (UNCST) and you are **not** required to get clearance since you are a Master's Degree research. Refer to UNCST Research registration and clearance Policy and guidelines (July 2016) in Uganda section 6(e).

The following is the list of all documents approved in this application by **UG-REC _026:**

	Document Title	Language	Version	Version Date
1.	Protocol	English	1.0	2025-01-26
2	Hand Hygiene Observation form	English	1.0	2025-01-26
3	Interview guide	English	1.0	2025-01-26

Signed and Stamped

.....

Prof. Peter Waiswa.
UCUREC Chairperson,
pwaiswa@musph.ac.ug

UGANDA CHRISTIAN UNIVERSITY APPROVED UNTIL 03 FEB 2026 RESEARCH ETHICS COMMITTEE

P.O. Box 4, Mukono, Uganda, Plot 67-173, Bishop Tucker Road, Mukono Hill
Tel: +256 (0) 312 350 885 Fax: +256 (0) 4142 90 800 Email: rec@ucu.ac.ug Web: www.ucu.ac.ug

UGANDA CHRISTIAN UNIVERSITY

A Centre of Excellence in the Heart of Africa

DISTRICT HEALTH OFFICE
18 MAR 2025
LIRA DISTRICT LOCAL GOV'T
P.O. BOX 49, LIRA

Permission Granted
18/03/2025

17th March 2025

The District Health Officer (DHO)
Lira District, Uganda

Dear Sir,

Re: Request for Permission to Conduct Research on Compliance to Hand Hygiene Among Healthcare Workers in Maternity Wards in Lira City and Lira District, Uganda

I am a student at Uganda Christian University, pursuing a Master of Public Health, and I am conducting the above research study as part of my academic requirements. I am writing to request permission to conduct this study at **Amach HCIV** and **Ogur HCIV** in Lira District.

As you know, healthcare-associated infections (HCAIs), particularly maternal and neonatal sepsis, are significant contributors to morbidity and mortality in Uganda. Ensuring proper hand hygiene is a critical measure in reducing such infections.

The study will employ a mixed-methods approach, including direct observation of hand hygiene practices by healthcare workers, assessment of hand hygiene infrastructure (soap, water, and alcohol-based hand rub), and interviews with healthcare workers to explore their knowledge, attitudes, and barriers to adhering to hand hygiene guidelines.

This study aims to contribute to the understanding of hand hygiene compliance and enhance infection prevention practices in maternity wards, potentially reducing maternal and neonatal morbidity and mortality.

The study has been approved by the University Research Ethics Committee. Consent will be obtained from participating health workers, and confidentiality will be maintained, with no personal identities recorded during observations.

I am happy to provide any additional information or documentation you may require. I look forward to your favourable response.

Thank you for considering this request.

Yours sincerely,

Leonard Rotich
Master of Public Health Student
Uganda Christian University

OFFICE OF THE TOWN CLERK
LIRA CITY

Plot No. 5-6, Boma Circus, P.O. Box 199, Lira. Tel. 0772504203/0782019685 E-mail: liracitycouncil@gmail.com

REF: Ref: CR/156/3 **Date: 19th March, 2025**

Mr. Lenard Rotich,
Master of Public Health Research Student,
UGANDA CHRISTIAN UNIVERSITY.

RE: PERMISSION TO CARRY OUT RESEARCH.

This is to inform you that your request to carry out research within the Lira City is considered and permission is hereby granted to you to carry out research data collection in Lira City specifically in PAG Mission Hospital, Lira University Hospital and Ober Health Centre IV with effect from **March 2025 to April, 2025** on the topic: "**Compliance To Hand Hygiene Among Healthcare Workers In Maternity Wards In Lira City And District, Uganda**".

However your attention is drawn to Section J-f of the Uganda Public Service Standing Orders, 2021 and Circular Standing Instruction No. 3 of 2011, relating to Research and Data Collection in the Public Service.

The Head of Health Department is hereby requested to render all the necessary assistance.

Yours faithfully,

FOR: CITY TOWN CLERK
LIRA CITY COUNCIL
19 MAR 2025
P.O. BOX 199, LIRA (U)

Ogwal Bonny
FOR TOWN CLERK, LIRA CITY

Copies to; ~~The Town Clerk~~, **Lira City East and West Divisions**
City Health Officer, Lira City,
Head of Human Resource Management Unit, **Lira City**
The Incharges of **PAG Mission Hospital, Lira University Hospital and Ober Health Centre IV**
The UCUREC Chairperson, **Uganda Christian University**

Uganda Vision 2040

OFFICE OF THE TOWN CLERK
LIRA CITY

Plot No. 5-6, Boma Circus, P.O. Box 199, Lira. Tel. 0772504203/0782019685 E-mail: liracitycouncil@gmail.com

REF: Ref: CR/156/3 **Date: 19th March, 2025**

Pentecostal Assemblies Of God Mission Hospital * P. O. Box 557, Lira-Uganda *
20th/3/25

Mr. Lenard Rotich,
Master of Public Health Research Student,
UGANDA CHRISTIAN UNIVERSITY.

RE: PERMISSION TO CARRY OUT RESEARCH.

This is to inform you that your request to carry out research within the Lira City is considered and permission is hereby granted to you to carry out research data collection in Lira City specifically in PAG Mission Hospital, Lira University Hospital and Ober Health Centre IV with effect from **March 2025 to April, 2025** on the topic: "**Compliance To Hand Hygiene Among Healthcare Workers In Maternity Wards In Lira City And District, Uganda**".

Permission granted to carry out research at PAG Mission Hospital

However your attention is drawn to Section J-f of the Uganda Public Service Standing Orders, 2021 and Circular Standing Instruction No. 3 of 2011, relating to Research and Data Collection in the Public Service.

The Head of Health Department is hereby requested to render all the necessary assistance.

Yours faithfully,

FOR: CITY TOWN CLERK
LIRA CITY COUNCIL
19 MAR 2025
P.O. BOX 199, LIRA (U)

Ogwal Bonny
FOR TOWN CLERK, LIRA CITY

Copies to; ~~The Town Clerk,~~ **Lira City East and West Divisions**
City Health Officer, Lira City,
Head of Human Resource Management Unit, **Lira City**
The Incharges of **PAG Mission Hospital, Lira University Hospital and Ober Health Centre IV**
The UCUREC Chairperson, **Uganda Christian University**

UGANDA CHRISTIAN UNIVERSITY
A Centre of Excellence in the Heart of Africa

LIRA UNIVERSITY
CENTRAL REGISTRY
31 MAR 2025
RECEIVED

27th March 2025

The University Secretary
Lira University

Thru:

The Hospital Director
Lira University Hospital

Forwarded for Consideration
28.3.2025

Dear Sir/Madam,

Re: Request for Permission to Conduct Research on Compliance to Hand Hygiene Among Healthcare Workers in Maternity Wards at Lira University Hospital

I hope this letter finds you well. I am a Master of Public Health student at Uganda Christian University, conducting a research study titled **"Compliance to Hand Hygiene Among Healthcare Workers in Maternity Wards at Comprehensive Emergency Obstetric and Newborn Care Health Facilities in Lira City and Lira District, Uganda"** as part of my academic requirements.

The research will involve direct observation of hand hygiene practices, an assessment of hand hygiene infrastructure (soap, water, and alcohol-based hand rub), and interviews with healthcare workers to explore their knowledge, attitudes, and challenges in adhering to hand hygiene protocols.

The findings of this study will contribute to improving hand hygiene practices and infection prevention efforts in the maternity ward, potentially reducing maternal and neonatal morbidity and mortality.

The study has been approved by the Uganda Christian University Research Ethics Committee, and consent will be obtained from participants. Confidentiality will be maintained throughout the study, with no personal identities recorded during observations.

I kindly request permission to conduct this study at Lira University Hospital. I am happy to provide any additional information or documentation you may need.

Thank you for your consideration.

Yours sincerely,
Leonard Rotich
Master of Public Health Student

TELEPHONES:

Hospital Director 0772714386
PHA 0772499984
E-Mail: info@lirarrh.ug.go
In any correspondence on this
Subject please quote Ref. No:

THE REPUBLIC OF UGANDA

MINISTRY OF HEALTH
LIRA REGIONAL REFERRAL
HOSPITAL
P.O. BOX 2, LIRA

2nd April, 2025

To:

LEONARD ROTICH
Uganda Christian University
REG NO: RJ23M21/023

RE: COMPLIANCE OF HAND HYGIENE AMONG HEALTH CARE WORKERS IN MATERNITY WARDS IN COMPREHENSIVE EMERGENCY OBSTETRIC AND NEW BORN CARE HEALTH FACILITIES IN LIRA CITY AND LIRA DISTRICT, UGANDA.

The research committee at Lira Regional Referral Hospital reviewed your proposal "Compliance of hand hygiene among health care workers in Maternity wards in Comprehensive Emergency Obstetric and New born care health facilities in Lira City and Lira District, Uganda" on 26 March 2025, and I am glad to inform you that the committee has granted you permission to proceed.

This letter therefore comes to let you know that Lira Regional Referral Hospital has granted your request for administrative approval to conduct the study at LRRH.

This being a research in partial fulfilment of a Master's degree, the committee has waived the requirement for UNCST approval. The condition for this administrative approval is that you furnish the research office with the local IRB approvals, share proof of payment, that you use trained research assistants to collect data, and that you do not use the hospital resources for your research without express permission.

Remember, this is not ethical approval. It is your duty to ensure that you conduct the study in accordance with the established ethical standards (you must have ethical approval at a minimum), the approved protocol and the UNCST guidelines. The hospital also expects that you provide a copy of your research report to the research committee at the conclusion of your research.

Good luck with your study.

Sincerely,

FOR: HOSPITAL DIRECTOR
P.O BOX 2, LIRA
02 APR 2025
LIRA REGIONAL REFERRAL HOSPITAL

Francis Kiweewa
Chairman Research Committee
Lira Regional Referral Hospital.

C.C. Hospital Director (HD)
C.C. Principal Hospital Administrator (PHA)
C.C. Senior Principal Nursing Officer (SPNO)

Received
04/03/25

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SCHOOL OF RESEARCH & POSTGRADUATE STUDIES

DISSERTATION CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)

Date: 28/8/2025

Name of Candidate: Rotich Leonard **Reg. No:** RJ23M21/023

Title of Dissertation: COMPLIANCE TO HAND HYGIENE AMONG HEALTHCARE WORKERS IN MATERNITY WARDS IN COMPREHENSIVE EMERGENCY, OBSTETRIC AND NEW-BORN CARE HEALTH FACILITIES IN LIRA CITY AND LIRA DISTRICT, UGANDA

SN	COMMENTS BY EXTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	The candidate should state the theoretical frame work used for the qualitative component of this study	I added the theoretical framework guiding the qualitative component, describing its relevance and how it informed data collection and analysis.	See Chapter one, Section 1.9- Theoretical Framework (p. 7).
2	The candidate should make operational definitions for hand hygiene as used in this study. How did the candidate determine	1. I made definition for hand hygiene clearer and added definition for compliance in the operational definitions section.	See Operational Definitions (pg xiii)

	whether a health worker hand practiced hand hygiene or not?	2. I added description of how the health worker was determined to have performed hand hygiene in the methodology section	and study procedure (Section 3.11.3, p. 25)
3	The candidate should describe the study procedure clearly. How did the candidate identify the health facilities of interest? How did he identify the health workers? How did he approach the health facilities, interest the health workers to participate in the study, assess them for eligibility and consent them to participate in the study?	I revised the methodology to provide a detailed description of the study procedure, including selection of facilities, identification and recruitment of health workers, and consent procedures.	See Chapter Three, Section 3.11– Study Procedure, p. 25
4	How was the qualitative data collected? Was a voice recorder used to capture the voices? Who conducted the qualitative interviews and was the candidate assisted by a socio scientist to collect and analyze the qualitative data? How did the candidate decide that saturation had been reached to stop qualitative data collection?	I expanded the methodology to explain the qualitative data collection process, specifying tools used, the role of the researcher and the process for determining data saturation.	See Chapter Three, Section 3.11.4 – Qualitative data collection, p. 23
5	The candidate should describe how the data was managed and entered in a statistical program for analysis and who did the data entry, data cleaning and analysis.	I included a clear description of data management procedures, specifying the statistical software used, steps in data entry and cleaning, and my role in data analysis.	See Chapter Three, Section 3.12 – Data Management and Analysis, p. 26
6	The candidate should bullet the conclusions	I revised the conclusion section, restructuring it into bullet points for better readability and alignment with examiner guidance.	See Chapter Six, Section 6.1 – Conclusions, p. 56

SN	COMMENTS BY INTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	The problem statement is well written but weak because it does not have relevant literature/citations to support it	I revised the problem statement and strengthened it by integrating recent literature and relevant citations that highlight the burden of maternal and neonatal sepsis and gaps in hand hygiene compliance	See Chapter One, Section 1.2 – Problem Statement (p. 3)
2	A conceptual framework was used but there are theories such as the health belief model and theory of planned behavior which could guide this research even better.	I included a section on theoretical framework with perspectives from the Health Belief Model and Theory of Planned Behavior, explaining their relevance to hand hygiene compliance. I also incorporated the two theories in the discussion	See Chapter one, Section 1.9 - Theoretical Framework, p. 7 and chapter 5- discussion, p. 47-55
3	It is likely that the findings were affected by the Hawthorne effect because the participants knew that they were being observed!! So, the findings may not be VALID!	I addressed the potential influence of the Hawthorne effect as a study limitation, acknowledging its possible impact on the findings, and stated how this was minimized	See Chapter Five, Section 5.4 – Study Limitations, p. 55
4	The analysis could be deeper- for example by doing the Chi-square tests of independence to see if there were any significant differences …. This could still be done	I conducted additional statistical analysis, including Chi-square tests of independence, and proportion z-test to determine whether significant differences existed across hand hygiene opportunities, staff categories, facility levels and facility ownership.	See Chapter Four, Section 4.2 – Quantitative findings, p. 30-34
5	The conclusions come from the findings and they are useful. Would even be better if deeper analytical analysis is done on the quantitative data	I strengthened the conclusions by integrating results from the additional statistical analysis, highlighting significant findings	See Chapter six, Section 6.1 – Conclusions, p. 56

SN	COMMENTS BY VIVA VOCE PANNEL	ACTION TAKEN	INDICATOR
1	The study may be affected by the Hawthorne effect, which could compromise validity.	I addressed the potential influence of the Hawthorne effect as a study limitation, acknowledging its possible impact on the findings, and stated how this was minimized	See Chapter Five, Section 5.4 – Study Limitations, p. 55
2	Clarify the validity and reliability of the research tools used	I elaborated on the processes used to ensure validity and reliability of both quantitative and qualitative research tools, including pre-testing and expert review	See Chapter Three, Section 3.10 – Validity and Reliability of Tools, p. 24
3	Place greater emphasis on hand hygiene rather than sepsis in the background and problem statement	I revised the background and problem statement to give stronger emphasis to hand hygiene as the central theme, while retaining sepsis as the related outcome.	See Chapter One, Sections 1.1 – Background and 1.2 – Problem Statement (p. 1-3)
4	Revise the general objective to reflect both qualitative and quantitative aspects; the third objective is too broad, and the verb explore should be incorporated into the general objective.	I revised the general objective to explicitly cover both qualitative and quantitative components and rephrased the third objective to use the verb “establish”	See Chapter One, Section 1.3 general objective and 1.4 – specific Objectives, p. 4
5	Specify the benchmark or reference point when stating that compliance is low	I revised the discussion to compare compliance levels observed in this study with WHO recommended standards and findings from similar studies.	See Chapter Five – Discussion, p. 48
6	Clearly highlight the key contribution of the study.	I added a section in the discussion section to clearly articulate the study’s contribution to knowledge and practice, particularly in relation to maternity settings in low-resource contexts.	See Chapter five, Section 5.5 - Contribution of the Study, p.55

Rotich Leonard ..... **Dr. Okello James** .....

Candidate’s Name Signature Supervisor’s Name Signature