

**HARAMAYA UNIVERSITY
POSTGRADUATE PROGRAMS DIRECTORATE**

**ADHERENCE TO HAND HYGIENE STANDARD AND ASSOCIATED
FACTORS AMONG HEALTHCARE PROFESSIONALS IN AGRO-
PASTORAL WOREDAS' PUBLIC HEALTH FACILITIES OF WEST
HARARGHE ZONE, EASTERN ETHIOPIA**

MPH THESIS

AHMED BEDRU AHMED

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**Adherence to Hand Hygiene Standard and Associated Factors among
Healthcare Professionals in Agro-pastoral Woredas' Public Health Facilities
of West Hararghe Zone, Eastern Ethiopia.**

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Ahmed Bedru Ahmed

Major Advisor: Negga Baraki (MPH, Assistance Professor)

Co-Advisor: Sisay Habte (MSc, Assistant Professor)

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Haramaya University, Harar

APPROVAL SHEET

HARAMAYA UNIVERSITY POST GRADUATE PROGRAM DIRECTORATE

I hereby certify that I have read and evaluated this thesis entitled “Healthcare Professionals’ Adherence to Hand Hygiene Standard and Associated Factors in Agro-pastoral Woredas’ Healthcare Facilities of West Hararghe Zone, Eastern Ethiopia” prepared under my guidance by Ahmed Bedru. I recommend that it was submitted as fulfilling the thesis requirement.

Negga Baraki (Ass. Prof.)

Major Advisor

Signature

Date

Sisay Habte (Ass. Prof)

Co-Advisor

Signature

Date

As a member of the Board of Examiners of the MPH Thesis Open Defense Examination, I certify that I have read and evaluated the thesis prepared by Ahmed Bedru and examined the candidate. I recommend that the thesis be accepted as fulfilling the Thesis requirements for the degree of Masters of Public Health in Epidemiology.

Wegene Diriba (Ass. Prof)

Chair Person

Signature

Date

Hassan Abdi (Ass. Prof)

Internal Examiner

Signature

Date

Yohannis Kebede (PhD)

External Examiner

Signature

Date

Final approval and acceptance of the thesis is contingent upon the submission of its final copy to the Council of Graduate Studies (CGS) through the Candidate’s Department or School Graduate Committee (DGC or SGC)

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Name: Ahmed Bedru Ahmed: _____

Date of Submission: November 2024

School: Public Health: Epidemiology

BIOGRAPHICAL SKETCH

The author was born in Mieso Agro-pastoralist Woreda, West Hararghe Zone, Oromia, Ethiopia on May 6, 1981. Attended and completed his elementary and junior secondary school at Mieso. After taking grade eight national exam, he left Mieso for Diredawa in search for further schooling where he embarked on learning at Diredawa comprehensive High School. He directly joined Jimma University Institute of Health Campus after 4-year stay; he graduated with bachelors of Chemistry on July 8, 1997 E.C/ 2005 G.C. Besides, this author obtained Diploma in Human Nutrition from UK online learning and many more certificates in Project management, Leadership, Psychology, Menstrual Hygiene Management, Climate-Health, Education and Nutrition in Emergencies from UNICEF_AGORA and DisasterReady. He served Diredawa secondary school as Chemistry teacher as well as department secretary for Chemistry, Physics and Biology for two years. Then went to Oromia West Hararghe Mieso Secondary school where he promoted to Director and advanced to leading the sector-wide. He was majorly in charge of Mieso Woreda School Water Sanitation-Hygiene and Home Grown School Feeding Program coordinator and further worked as facilitator with IMC and IR for years as focal person. Further, he served as the Head of the Social Affairs Sectors Standing Committee within the Mieso Woreda Permanent Peoples' Representative Council, while also contributing to the role of Gender and Child Mainstreaming. Over a period exceeding seven years, he was responsible for coordinating, overseeing complaints, monitoring and evaluating eight social sectors, with a primary focus on Health and Education. He was authorized to assessing the performance of these sectors through activities such as planning, measuring key performance indicators, providing appraisal status, and delivering feedback. This was accomplished using detailed written reports given to each of multi-sectors through the council in quarterly review workshops. Now he is pursuing a degree of Master of Public Health in Epidemiology at Haramaya University.

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ACRONYMS AND ABBREVIATIONS

ABHR	Alcohol Based Hand Rub
AOR	Adjusted Odds Ratio
COR	Crude Odds Ratio
CDC	Centre for Disease Control
FMOH	Federal Ministry of Health
HAIs	Health Care Associated Infections
HCPs	Health Care Professionals
HCFs	Health Care Facilities
HH	Hand Hygiene
HHA	Hand Hygiene Adherence
HHS	Hand Hygiene standards
HW	Hand Washing
IPC	Infection Prevention and Control
IPCC	Infection Prevention and Control Committee
SP	Standard Precaution
UNICEF	United Nations International Children's Emergency Fund
WHZ	West Hararghe Zone
WHO	World Health Organization

TABLE OF CONTENTS

APPROVAL SHEET	i
STATEMENT OF THE AUTHOR	iii
BIOGRAPHICAL SKETCH	iv
ACKNOWLEDGMENTS	v
ACRONYMS AND ABBREVIATIONS	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	x
LIST OF FIGURES	xi
ABSTRACT	xii
1. INTRODUCTION	1
1.1. Background	1
1.2. Statement of the Problem	3
1.3. Significance of the Study	6
1.4. Objective	6
1.4.1. General Objective	6
1.4.2. Specific Objectives	6
2. LITERATURES' REVIEW	7
2.1. Healthcare Professionals' Level of Adherence to Hand Hygiene	7
2.2. Factors Associated with Adherence to Hand Hygiene	8
2.2.1. Socio-Demographic Factors	8
2.2.2. Individual Factors	9
2.2.2.1. Knowledge	9
2.2.2.2. Attitudes	10
2.2.3. Healthcare Facility-Institutional Associated Factors	10
2.3. Healthcare Professionals' Perception towards Optimal Hand Hygiene	12
2.3.1. Healthcare Professionals' Perceived Barriers to Hand Hygiene Adherence	12
2.3.2. Healthcare Professionals' Perceived Accelerators to Optimal Hand Hygiene	12
2.3.3. Hand Hygiene from Knowledge, Attitude and Practice Perspective	13
2.4. Conceptual Frame Work	14
3. METHODS AND MATERIALS	15
3.1. Study Area and Period	15
3.2. Study Design	15
3.3. Population	15

3.3.1. Source Population.....	15
3.3.2 Study Population	15
3.4. Inclusion and Exclusion Criteria	15
3.4.1. Inclusion Criteria.....	15
3.4.2. Exclusion Criteria.....	16
3.5. Sample Size Determination	16
3.5.1. Sample Size Determination for First Objective	16
3.5.2. Sample Size Determination for Second Objective.	16
3.5.3. Sample Size Determination for Third Objective.....	17
3.6. Sampling Procedure and Technique	17
3.7. Data Collection Methods	20
3.7.1. Data Collection Tools/Instruments.....	20
3.7.2. Data Collectors and Supervisors	20
3.7.3. Data Collection Procedure.....	20
3.8. Study Variables	21
3.8.1. Dependent Variable	21
3.8.1. Independent Variables.....	21
3.9. Operational Definitions	21
3.10. Data Quality Control.....	23
3.11. Methods of Data Processing and Analysis	24
3.12. Ethical Considerations	26
4. RESULTS.....	27
4.1. Socio Demographic Characteristic of the Study Participants	27
4.2. Healthcare Professional Related Factors	28
4.2.1. Attitude towards Hand Hygiene.....	28
4.2.2. Level of Knowledge Regarding Hand Hygiene.	29
4.3. Perspectives of Behavioral Factors towards Hand Hygiene Adherence	31
4.3.1. Subjective Norm Perspective.....	31
4.3.2. Perceived Behavioral Control Perspective	31
4.4. Healthcare Facilities-Related Factors to Hand Hygiene	32
4.4.1. System Change Component (Accessibility of Hand Hygiene Products-Facilities).....	32
4.4.2. Training and Education Component of Multi-Modal Hand Hygiene	33
4.4.3. Workplace Reminders Component of Multi-Modal Hand Hygiene	34
4.4.4. Evaluation and Feedback component of Multi-Modal Hand Hygiene.....	35

4.4.5. Safety Climate Component of Multi-Modal Hand Hygiene	35
4.5. Healthcare Professionals Level of Adherence to Hand Hygiene.	36
4.5.1. Adherence to Hand Hygiene Standard by Indicative Moments.	36
4.5.2. Overall Adherence to Hand Hygiene Standard	37
4.6. Factors Associated with Adherence to Hand Hygiene.....	38
4.6.1. Bivariable Factors Associated with Adherence to Standard Hand Hygiene Practices ..	38
4.6.2. Multivariable Factors Associated with Adherence to Hand Hygiene.....	41
5. DISCUSSION	48
5.1. STRENGTH AND LIMITATION OF THE STUDY	53
5.1.1. Strength of the Study	53
5.1.2. Limitation of the Study.....	53
6. CONCLUSIONS AND RECOMMENDATIONS	54
6.1. Conclusion	54
6.2. Recommendation	55
7. REFERENCES.....	56
8. ANNEXES	60
8. 1. Information Sheet and Informed Consent for Heads of Health Facility.....	60
8.2. Participant Information Sheet and Voluntary Consent Form for Quantitative Study	62
8.3. Participant Information Sheet and Informed Consent for Qualitative study	64
8.4. Data Collection Instruments.	66
8.4.1. English Version Questionnaire for Quantitative Study	66
8.4.2. Afaan Oromoo Version Questionnaire.....	71
8.4.3. Healthcare Facility Assessment- Document Review Observation Checklist.....	77
8.4.4. Tentative Interview Questions for Qualitative Data.....	82
8.5. Curriculum Vitae (CV) of the Principal Investigator (PI)	83

LIST OF TABLES

Table: 1. Socio-demographic characteristics of HCPs in Public healthcare facility in Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia, 2024 [n=141]-----	27
Table: 2. Healthcare Professionals' Attitude towards Hand Hygiene Standard in Health Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Ethiopia 2024 [n=141].-----	28
Table: 3. Healthcare Professionals' Knowledge level about Hand Hygiene Standard in Healthcare Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].-----	30
Table: 4. Healthcare Professionals' Subjective Norm and Behavioral Control belief perspective towards Hand Hygiene Standard in Healthcare Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].-----	31
Table: 5. Healthcare Professionals' Behavioral Control Belief perspective towards Hand Hygiene Standard in Healthcare Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]-----	32
Table: 6. HCPs' level of adherence to Hand Hygiene in Healthcare Facility of Mieso and Gumbi Boarded Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]-----	37
Table: 7. Bivariable factors associated with standard hand hygiene of HCPs in Healthcare Facility of Mieso and GBoredede of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]----	39
Table: 8. Multivariable factors associated with standard hand hygiene of HCPs in Healthcare Facility of Mieso and GBoredede of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]----	45

LIST OF FIGURES

FIGURE : 1. CONCEPTUAL FRAMEWORK OF HCPS ADHERENCE TO HH CONSTRUCTED BY THE INVESTIGATOR FROM READINGS OF DIFFERENT LITERATURES	14
FIGURE: 2. COMPRHENSIVE SAMPLING PROCEDURE TO SELECT HEALTH PROFESSIONALS TO ASSESS ADHERENCE TO HAND HYGIENE AND ASSOCIATED FACTORS IN HEALTH FACILITY IN WOREDAS OF WEST HARARGHE ZONE, 2024.-----	19
Figure: 3. Items of System Change component of Multimodal Hand Hygiene in Healthcare Facility of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].-----	33
Figure: 4. Training and Education component of Multimodal Hand Hygiene in Healthcare Facility of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].-----	34
Figure: 5. Workplace reminders component of Hand Hygiene in Healthcare Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]-----	35
Figure: 6. Evaluation and Feedback component on Hand Hygiene in Health Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].-----	35
Figure: 7. Safety climate/work environment level to Hand Hygiene in Health Facility of Mieso and Gumbi Boredede Woreda West Hararghe Zone, Eastern Ethiopia 2024 [n=141]-----	36
Figure: 8. Overall Level of Adherence to Hand Hygiene Standard in Healthcare Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]--	38

ABSTRACT

Background: Effective hand hygiene is a cost-efficient strategy for preventing infections and delivering substantial health benefits. Healthcare facilities with poor hand hygiene become hotspots for microbial infections, leading to increased illness and potential fatalities among patients. This mixed-method study was attentive to examine rural lower-level health centers.

Objective: The study sought to investigate adherence to hand hygiene standards and associated factors among healthcare professionals in public healthcare facilities within the agro-pastoral woredas of the West Hararghe Zone, Eastern Ethiopia, from August 25 to September 15, 2024.

Methods: A cross-sectional mixed-method study design was employed, including all 156 healthcare professionals comprehensively. For the qualitative component, 12 participants were purposively selected until saturation was reached. Data were collected using self-administered questionnaires and semi-structured interviews. Quantitative data were processed with Epiinfo-7.2 and analyzed in STATA 17. Logistic regression used to assess associations between explanatory variables and outcomes. Statistical significance was defined at $p < 0.05$, with odds ratios indicating the direction and strength of associations. Qualitative data were analyzed thematically.

Results: 141 healthcare professionals participated, yielding a response rate of 90.4%. The study revealed that overall adherence to hand hygiene standards was approximately 18% (95% CI: 12.2%, 24.9%). Key predictors of adherence included the presence of workplace reminders (3 times more adherence; AOR=3.0, 95% CI=1.09, 8.01), subjective norms (5.9 times; AOR=5.9, 95% CI=1.06, 33.85), perceived behavioral control (0.14 times; AOR: 0.14, 95% CI: 0.02, 0.95), and system changes (10.5 times; AOR=10.5, 95% CI: 2.2, 49). Knowledge of hand hygiene standard 2.9 times (AOR=2.9, 95% CI=1.06, 8.11), while leadership having a joint yearly hand hygiene target/plan led to a 7.8 times increase in adherence (AOR=7.8, 95% CI=2.15, 22.05).

Conclusion: The study found that only one in five healthcare professionals adhered to hand hygiene standards, posing significant infection risks for both patients and healthcare-professional. Qualitative interviews indicated that hand hygiene strategies were not effectively adopted. There appeared role-confusion perception effect from the demands of serving multiple departments while providing services in an overcrowded room at lower-level health centers, which overwhelmed healthcare professionals to have poor hand hygiene adherence. Hence, it emphasized focused interventions to tackle systemic obstacles and behavioral factors.

Keywords: *hand washing, hand hygiene adherence, standard precautions, Infection Prevention.*

1. INTRODUCTION

1.1. Background

Hands are the most exposed part of the body to germs. Consequently, if not cleaned properly hands are capable of transmitting 50% to 80% of microorganisms acting as a vehicle for pathogenic cross-contamination. The term "hand hygiene" (HH) refers to the process of removing soil, debris, and microbes by cleansing hands using clean water, plain soap or antimicrobial soap, antiseptic agents, and sanitizers. It is the practices and measures taken to prevent the spread of infection through contacts, either by washing or rubbing at points of care and after visiting toilet within 5 meters in healthcare facilities (HCFs). Thus, HH is considered as a premier and crucial component of standard precaution (SP) for prevention of healthcare-associated infections (HAIs) (CDC, 2016, FMOH, 2021a, FMOH, 2021b).

Typical methods of HH comprises of hand washing (HW) which is the process of mechanically removing visibly soiled and transient flora from hands using soap and clean water. The second type of HH is Alcohol-Based Hand Rub (ABHR) which is a fast-acting antiseptic that reduces resident flora, kills transient flora on the hands, and has the potential to protect the skin depending on the ingredients. The gold standard HH method in HCFs is ABHR because of its activity against a broad spectrum of epidemiologically important pathogens transient flora, and because compared with soap and water, use of ABHR increases HHA by requiring less time 20sec, irritating hands less, and facilitating HH even at the patient bedside. Soap and water better used when hands are visibly soiled (e.g., blood, body fluids) and preferred after caring for a patient with known or suspected *Clostridium difficile* or norovirus during an outbreak (CDC, 2016, FMOH, 2022).

The purpose of HH to be documented in history dates back to 1847 when Ignaz Semmelweis, used a chlorinated lime solution to reduce high mortality rates in maternity clinics. He observed puerperal fever, also known as "childbed fever," and the lack of HH. The hands of healthcare professionals (HCPs) were responsible for the occurrence of puerperal fever in parturient women. Hand washing (HW) significantly decreased the maternal mortality rate, providing the first evidence that HH reduces HAIs (CDC, 2016, Bhattacharya, 2022, UNICEF, 2021).

Scientific evidence and experiences from World Health Organization (WHO) has also shown that improving HHS strategies in HCFs can reduce: HAIs, antimicrobial resistance (AMR) microbes and several diseases (FMOH, 2021a). Management of diarrhea and pneumonia in developing countries cost an average of 12 billion USD annually whereas one national program on HH costs less than 100 million USD. Improving HH standards can generate savings in health expenditure up to 15 times the cost. During the COVID-19 pandemic, HH received unprecedented attention and became a central pillar in national COVID-19 prevention strategies. This has created a unique opportunity to position HH as an important long-term public policy issue. The evidence showed that HH is a highly cost-effective investment, providing outsized health benefits for relatively little cost. Ensuring sustainability of the better attention given for HH during COVID-19 through adopting strong HH strategy is critical (FMOH, 2021a, FMOH, 2021b, FMOH, 2022).

Adherence to HH standard precaution include use of procedural HW or ABHR applying adequate volume of it on surface of hands at critical moments. Critical key indications when HH moments should be performed include: before direct contact with a patient, including aseptic procedures; after direct contact with a patient; immediately after exposure to body fluids, after touching a patient's surroundings. Besides, before and after glove use and after toilet, emphasizing proper techniques: rubbing hands together, covering all surfaces, including between fingers and under shortened nails while removal of rings-bracelets being appreciated (WHO, 2013, WHO, 2020).

Indeed, historical evidence has shown that the progress of HH become more prominent during high profile disease outbreaks such as influenza, Ebola, and most recently, the COVID-19 pandemic. It is crucial for all to embrace HH as vital daily behavior or habit, rather than viewing it as a temporary measure during times of crisis. HHA levels are considered well at 80% or higher (WHO, 2020). However, adherence to the recommended HHS remains unacceptably low owing to individual and organizational factors. Therefore, this researcher drawn to study the status of HHA by HCPs because the selected Woredas exposed to recurrent infectious outbreaks with notable casualty. This was the motive that initiated this study to seek the cost-effective way of combating infections. For HHS in all settings particularly in HCFs can combat HAIs; contribute to both health and economic resilience. Hence, according to UNICEF a given country must quadruple the current rate of progress to achieve the Sustainable Development Goal 6 target 6.2

on HH. Therefore, it is supposed that the time is now to accelerate progress on HH to prevent the next health crisis that might be falling upon us all (FMOH, 2022, UNICEF, 2021).

1.2. Statement of the Problem

Adherence to Hand hygiene standard is a cost-efficient public health measure for healthcare associated infections (HAIs) which is a major public health problem. The currently launched Hand Hygiene for All (HH4A) initiative as such a measure, envisioned HH is practiced as a habit regularly by all with the aim of channeling momentum into HHS strategy for sustainable change (FMOH, 2022). The WHO global campaign, "Clean Care for All – It's in Your Hands," highlights the pivotal role of HH in ensuring safer healthcare access to patients while enhancing service quality (FMOH, 2021a, WHO, 2020). Hence, not adhering to HH Standard has had devastating consequences to one's health (2009b, Sharon, 2022). This is because HAIs are affecting more than 10% of patients in developed countries and this number can be as high as 20-30% in developing countries. The incidences of HAIs are a concern in HCFs to be 12.7 per hundred patients globally. A review of the burden of HAIs in these emerging countries revealed that the overall prevalence to be more than 15.5%. (Alhumaid et al., 2021, Sharon, 2022).

Studies conducted in Algeria, Ethiopia, South Sudan, and Burkina Faso indicated HAIs prevalence rates to be ranging from 2.5% to 48 % cited in (Sharon, 2022). Globally, the estimated death rate among HAIs patients is 5% to 50%, more than half a million in number (UNICEF, 2021). The lion share being in Africa, even in developed countries HAIs showed a soaring number of 37,000 deaths from 4,544,100 infections in the Europe and about 2,000,000 infections and 100,000 deaths with financial costs exceeding \$4.5 billion annually in the US, these pose a serious threat to millions of people Worldwide (Ahmed et al., 2020, Engdaw et al., 2019). Although mostly preventable, these HAIs contributed more deaths than HIV AIDS, breast cancer, and car accidents combined (Dourado and Barros, 2017). This is due to suboptimal HHA among HCPs risking pathogens that leads to adverse patient outcomes: morbidity, prolonged hospital stays, and increased health costs (Arunakumar et al., 2024). However, HCPs adherence to HHS precaution has shown to reduce the risk of HAIs by 50% (Soboksa et al., 2021). Hence, investment of 3.35 USD on Hand Hygiene, 11 USD on latrine, 200 USD on water construction and many thousands USD on vaccines have equivalent public health outcomes (FMOH, 2022).

The Centers for Disease Control and Prevention (CDC) and the WHO recommends HHS as the first line of defense against HAIs for it breaks disease transmission cycle signifying the importance of HH standard (FMOH, 2012, UNICEF, 2021, CDC, 2016). Proper HH adherence to standard is very much at the core/top of guideline and is the undisputed single most effective infection prevention and control (IPC) procedures (WHO, 2020). HH reduces multi-drug resistance (MDR) microbes and prevent the spread of diseases such as respiratory, gastrointestinal diarrhea, bloodstream infections and neglected tropical disease (Alhumaid et al., 2021, FMOH, 2012).

Globally average HH adherence (HHA) prevalence rate remained at around 40%. However, can be as low as 20% in developed and 2% in developing countries (Dourado and Barros, 2017). Like-wise in Ethiopia in 2021 study the pooled HHA among HCPs was 38% (95% CI: 16%–59%) with the lowest HHA being reported from a study in South at Wachemo University Hospital to be 9% whereas the highest was in a study conducted in AaBET Hospital in Addis to be 90% (Soboksa et al., 2021). Further a cross-sectional study conducted in 2021 in some of Hararghe Hospitals, excluding all health centers and primary hospitals in Agro-pastoral Woredas found that HCPs to be 34.7% HHA (Umar et al., 2022). This is very much less than the acceptable minimum standard of 80% HHA by WHO. A study published in 2019, showed that 23.4% HHA rate among HCPs in a resource-limited setting (Abou Mrad et al., 2020). Another study found that HHA rate in this setting was only 16.7% to 23% (Rayson et al., 2021). These variation in findings indicated how far HCFs and HCPs HH perspective influenced by different settings, safety climate and contexts. In response to this low HHA, a multimodal HH improvement strategy considered as facilitators to HHS were devised focusing on: System change, training and education, evaluation and feedback, reminders and communication, institutional safety climate and the impact of HH on HAIs. Hence, it seen as an area of research gap and public health importance, for there is limited in-depth investigations in this context (SEID, 2015, WHO, 2013, WHO, 2020).

It is evident that HCFs services are an open system. If the nearby society of HCFs is very demanding to HHS behavior, HCPs are either encouraged or enforced to adhere to HH, being influenced by norms and/or behavioral control. According to FMOH (2022) basic HH is often neglected due to individual and organizational factors like HCPs behavior (attitude, knowledge,

practice), or lack of access to HH infrastructure in key places. Access to HH facilities in practicing HH policy during critical times at the point of care could vary between the type of the HCFs: rural and urban and among HCPs too. In Ethiopia, it is estimated that 42% of HCFs lack access to basic HW water supply and soap. Nearly 56% of those HCFs lacking access to soap and water were located in rural settings (FMOH, 2022, FMOH, 2021a). Consequently, in a country, where HCFs infrastructure may vary across different settings, it is essential to understand the HHS in contexts of Agro Pastoral Woredas (APWs) of West Hararghe Zone (WHZ). These APWs may present unique happenstances influencing HH of HCPs. It is hence worth studying as early as possible to manage the limited resource available in those HCFs. However, there existed if any, few studies utilizing mixed method design for depth understanding of the complex interplay influencing HHA. Most studies targeted the urban HCFs, but there was either limited or paucity of research focused on HCFs in rural setting for the fact that previous study has not touched HCFs in the selected APWs.

Further, most studies focused not on lower tier public HCFs like health centers that often serve as the initial point of contact for patients. It is crucial to understand that the impact of poor HH extends beyond the immediate HCFs. Neglecting HHS especially in lower-tier health centers that cater services to agro-pastorals with unique healthcare challenges can have far-reaching consequences for the lower tier HCFs contributes to the spread of HAIs in higher-level hospitals through patient referrals. Hence, Hospitals should better capacitate their cluster health centers and so do studies. Both must get focused and should work together to ensure a holistic approach to IPC throughout the healthcare system. This being another motive that initiated this study to seek the cost-effective way of combating infections. For HHS in all settings particularly in HCFs can combat HAIs; contribute to both health and economic resilience.

Lastly, HHA to its standard often increases during epidemics or pandemic due to the fear or increased awareness, but then it wanes with time and is difficult to sustain if strong strategy is not adopted (FMOH, 2022). It is important being vigilant and not letting HH behaviors' wane/ diminish, especially given the threat of new variants of Covid-19 and the untested nature of new vaccines (FMOH, 2022). Therefore, this study was further inspired to know whether the required HH behavior habitually sustained or not. In nutshell, this study initiated primarily to inspire

institutions/ HCFs in recognizing the significance of HHS not only in controlling the spread of diseases but also in building resilience to future outbreaks.

1.3. Significance of the Study

The findings of this study can help Healthcare professionals in prevention and control of the risks of healthcare associated infections HAIs through adherence to hand hygiene standard. Besides, the results of this study will inform healthcare facilities HCFs in the study area: six cluster health centers, one primary hospital as well as Woredas and Zonal Health Offices in planning. It will be an input for other interested organizations working on HH standards and its influencing factors in other settings like schools, emergencies and the community. It will also help improve HHS practices in the specific healthcare related facilities, demonstrating ways to decrease healthcare-associated infections. The insights gained can support the creation of tailored strategies that address the distinct needs and obstacles faced by these rural and lower level health centers. This information will further inform future research and interventions in HCFs, serving as a baseline survey for further studies in this area of WHZ.

1.4. Objective

1.4.1. General Objective

To investigate Adherence to Hand Hygiene Standard and Associated Factors among Healthcare Professionals in Agro-pastoral Woredas' Public Healthcare Facilities of West Hararghe Zone, Eastern Ethiopia from Augst 25 to September 15, 2024.

1.4.2. Specific Objectives

- ✓ Assess HCPs' level of adherence to hand hygiene standard in public healthcare facilities in agro-pastoral Woredas of WHZ.
- ✓ Identify factors associated with adherence to hand hygiene standard among HCPs in public healthcare facilities in agro-pastoral Woredas of WHZ
- ✓ Explore Perception of HCPs towards optimal hand hygiene in public healthcare facilities in agro-pastoral Woredas of WHZ.

2. LITERATURES' REVIEW

2.1. Healthcare Professionals' Level of Adherence to Hand Hygiene.

A cross-sectional study in rural Nepal in 2015 found HH adherence among HCPs to be surprisingly low at 24.25%, and of whom only 38.3% performed all HH steps correctly. Adherence varied by tier of healthcare facility and department (Kumar, 2015). Furthermore, an observational study conducted in Hiwot Fana Specialized University Hospital in 2018 found overall HHA of only 18.7%, with the highest of 22.9% before clean procedures and 19.6% during night shifts (Awoke et al., 2018). Contrary to these findings, a cross-sectional study in Debre Berhan referral hospital showed that HH compliance was similar across all professional categories and did not vary by shift but was lower before patient contact and aseptic procedures and higher after exposure/contact (Kolola and Gezahegn, 2017).

Moving on to another cross-sectional study in Tanzania in 2019 found overall HHA to be 39.2% against WHO's 51% benchmark and only 10.8% against 81% recommended benchmark. Adherence was higher in hospitals than health centers. Interestingly, the HHA were higher in hospitals compared to health centers, suggesting that hospital settings have better HHA due to factors such as higher staff numbers, better access to information, and active HH IPC teams (Rayson et al., 2021). These findings indicate the need for tailored IPC measures in different HCFs tiers, with special attention given to rural HCFs (Rayson et al., 2021). HHA in Addis hospitals in 2020 found to be higher after patient surroundings contact than other moments but follow-up was higher after patient/surroundings/fluids contact (Berman et al., 2021).

Shifting our focus to Wachamo University Hospital, a cross-sectional study in 2017 found overall HHA of only 9.2% very lowest but more adhered after fluids exposure than before contact/procedures (Meshesha et al., 2017). In another cross-sectional study of Addis Ababa general hospitals in 2019 reported overall HHA of 50.4% (Abdo et al., 2020). The overall HHA rates in cross-sectional conducted in Hospitals of Hararghe, in 2021, HHA found to be 37.4% among medical, surgical, operating room, outpatient department, gynecology/obstetrics, emergency ward, intensive care units, pediatrics, and other departments were ranging from 20.7% to 46.8%, (Umar et al., 2022). Similarly, a cross-sectional study at referral hospital of Moi in Kenya in 2021 found overall HHA of 26.3%, with ABHR products most used (MUDI, 2021).

In Dubti referral Hospital in Afar a cross-sectional study found 56.0% had poor HHA and 43.0% below-average compliance (Jemal, 2018). A meta-analysis of Ethiopia in 2022 estimated pooled HHA at 57.87% (Gedamu et al., 2020). However, a cross-sectional study of Dessie referral hospital in 2022 found a disappointing overall HHA of only 17.6% (Tesfaye et al., 2022).

2.2. Factors Associated with Adherence to Hand Hygiene.

2.2.1. Socio-Demographic Factors

According to a cross-sectional study conducted in Hospitals of Hararghe from July 1 to 30, 2021, it was found that male nurses had a 40% higher compliance rate with HHA compared to female nurse professionals (AOR: 0.60, 95% CI: 0.37, 0.97). This finding contradicts a study conducted in Kenya but aligns with a study conducted in Saudi Arabia. Among nurses, the age groups of 20-29 years and 30-39 years recorded HH rates above 50.00% in 85.00% and 78.26% of cases, respectively, indicating higher HHA in the younger age group (MUDI, 2021). The odds of nurses with 6-10 years of work experience with HHA were 1.71 times higher compared to those with less than 5 years of work experience (AOR: 1.71, 95% CI: 1.03, 2.86) (Umar et al., 2020). Another study revealed that having less than 5 years of work experience was associated with higher odds of HHA (AOR = 1.5; 95% CI: 1.2-2.5) (Daba et al., 2024).

In a cross-sectional study conducted in general hospitals in Addis Ababa in 2019, it was observed that individuals holding a master's degree or higher had 0.46 times odds of HHA (AOR [95% CI] = 0.46 [0.26, 0.84]), while first-degree holders had 0.43 times odds (AOR [95% CI] = 0.43 [0.23, 0.82]) compared to diploma holders (Abdo et al., 2020). Another cross-sectional study in Addis Ababa in 2020 examined socio-demographic variables and found variations in HHA based on age, work experience, sex, profession, and educational level. Participants aged 25 years and above had an 87% rate, those with more than 5 years of work experience had a 79% HHA rate, interns had an 84.6% and male participants had a 76.7% HHA rate. In terms of educational level, individuals with a master's degree or higher had an 86.7% HHA rate and exhibited a favorable attitude towards compliance with SP (NESRU, 2020).

In another study, lower compliance rates were observed in lower-tier HCFs such as health centers and district hospitals, while higher compliance rates were noted in higher-tier. HCPs working in

Tanzanian district hospitals were 2.6 times more likely to HHA (OR 2.62, 95% CI: 1.23, 5.56, P-value=0.0437), while HCPs working in rural health centers had 2.1 times higher odds of compliance compared to those in health posts (OR 2.17, 95% CI: 1.09, 4.38, P-value=0.0171) (Rayson et al., 2021). In a cross-sectional study in Addis in 2020, exposed there was no statistical difference in perceived HHA across professional categories ($p = 0.11$).

2.2.2. Individual Factors

2.2.2.1. Knowledge

According to cross-sectional study conducted in Shagar Addis in 2020, HH knowledge score amongst all participants was 16.6 ± 2.9 out of 27, indicating participants answered an average of 61.4% of questions correctly. On average, physicians scored highest (17.6 ± 3.2), followed by laboratory technicians (16.3 ± 2.7), and then nurses/midwives (16.2 ± 2.6). There was no statistically significant difference in knowledge scores between trained (16.2 ± 2.5) versus untrained (Berman et al., 2021). About half 194(52.6%) of the respondents were knowledgeable on HH. Only 98 (26.6%) of nurses were trained on HH in the last three years. The low level of training was highly related to poor knowledge. Regarding awareness on the presence of IPC committees, 205(55.6%), of them knew and the others not (Berman et al., 2021). A cross-sectional study conducted in 2021 in some Hararghe Hospitals, the mean knowledge score was 21.6% (SD: 2.08) (Umar et al., 2022). The pooled odds ratio of knowing the functionality of the IPC committee 1.96 times more likely to have HHA than those who did not (OR: 1.96, % CI: 0.45–3.47). However, the difference was not significant, and the included studies had a large amount of heterogeneity (Gedamu et al., 2020). A cross-sectional study in Gonder primary hospital in 2013 revealed that Knowledge to HH found to be linked to HHS in practice. Those who had good knowledge on HH had relative rate of 3.8 or a relative increase 280 % adherence to practice than those with poor knowledge (Abdella et al., 2014). Knowledge about HH had 6.8 relative rate or a relative increase of 580% adherence to HH practice (Engdaw et al., 2019).

2.2.2.2. Attitudes

A cross-sectional study in general hospitals in Addis in year 2019 showed there was 1.6 times more likely positive attitude leading to high HH SP practice than negative attitude (AOR [95% of CI] = 1.61 (1.09, 2.38) (Abdo et al., 2020). In the perception survey, in 2022, mentioned “strong smell of hand alcohol” and hand irritation as a reason for HH non-compliance that was increased significantly across units (10.1% to 22.9%; $P = 0.021$) (Wang et al., 2022).

2.2.3. Healthcare Facility-Institutional Associated Factors

A cross-sectional study conducted in Kenya in 2021 uncovered the impact of health institution and environmental factors on HCPs adherence to HH guidelines. The review related to HH revealed that studies not based on behavior change theories were ineffective. However, demonstrated a significant increase in self-reported HH compliance when participants had good perceived behavioral control and subjective norms (MUDI, 2021). Self-reported compliance increased 7-fold with good perceived behavioral control. Having adequate soap/water increased HH compliance 2.23 times (OR: 2.23, 95% CI: 0.44–4.01), and HH promotion increased it 2.14 times (OR: 2.14, 95% CI: 1.04–3.24). Keeping hands dry, as important as washing, reduced HAIs 3 times (AOR = 3.1; 95%CI: 2.2-4.4) (MUDI, 2021). In mixed method study conducted at primary hospitals in the Waghimira in 2020, it found that one-fifth HCP had good HH compliance. Training 3 times (AOR = 3.18, 95% CI: 1.39, 7.28) adequate soap/water 3.7 times (AOR = 3.77, 95%CI: 1.52, 9.37), ABHR 2.7 times (AOR = 2.67, 95%CI: 1.18, 6.05), and sinks 2.3 times (AOR = 2.31, 95%CI: 1.03, 5.14) more likely associated with HHA which also supported by the qualitative findings (Alene et al., 2022).

Furthermore, a cross-sectional study in Addis hospitals in 2019 found IPCC knowledge increased HH adherence 1.5 times (AOR [95% CI] = 1.57 (1.03, 2.38). Functioning sinks 2.3 times (AOR [95% of CI] = 2.26 (1.07, 4.79), running water 1.9 times more (AOR [95% of CI] = 1.86 (1.011, 3.432), and guidelines 1.7 times (1.66 AOR [95% (1.13, 2.43) more likely significantly associated with HH standard (Abdo et al., 2020). In observational assessments in public hospitals of Northeastern Ethiopia in 2020, found non-adherence was 41.8%. Work overload increased it 2.5 times (AOR = 2.5; 95%CI: 1.9-4.1), and water interruptions 2.8 times (AOR = 2.8; 95%CI: 2.1-4.9). HHA was 2.3 times higher after than before touching patients (OR 1.442; 95%CI 1.057-

1.968 and OR 2.333; 95%CI 1.8; 50-2.943) showing HCPs 2.3 times more HHA after touching (Daba et al., 2024). A meta-analysis in 2021 found towels/tissue, protocols, and ABHR availability increased adherence 3.97 times (OR: 3.97, 95% CI: 2.09–5.86). Sinks increased it 1.86 times (OR: 1.86, 95% CI: 0.35–3.37) (Soboksa et al., 2021).

Moving on to another cross-sectional study in Gondar primary hospitals conducted in 2019, found training increased adherence 8 times (AOR = 8.07, 95%CI: 2.91, 22.39), adequate soap/water 5 times (AOR = 5.10, 95%CI: 1.93, 13.52), and ABHR 3 times (AOR = 3.23, 95%CI: 1.32, 7.92) more adherence to HH SP. Going into another cross-sectional study of Addis Ababa in 2020, it found out that access for individual towel/tissue paper for drying is 2 times more likely HHA than who had not (Berman et al., 2021). Another Chinese cross-sectional study on HH showed that sufficient budget for IPC, regular feedback on performance, administrative motivations, the presence of monitoring and evaluation, auditing HH and providing timely feedback significantly improved HHC from (6.7% in November 2020 to 68.4%; $P = 0.021$ in April 2021) (Wang et al., 2022). Shifting our focus to a repeated cross-sectional study, in Spain, from 2005 to 2022 by Epidemiological Surveillance data the number of HH opportunities were inversely correlated with HHA 0.6 times (AOR]:0.6,95%CI:0. 0.8, $p \leq .01$). Besides, presence of 60% ABHR sanitizer at the point of care 6.4 times (AOR: 6.4, 95%CI: 1.1–38.3, $p \leq .05$) other associated factor was time period like outbreak event (before or during the COVID-19 pandemic) 2.0 times more compliancy (95%CI: 1.8-2.1) (Guerrero-Soler et al., 2024).

Finally, a cross-sectional study in 2021 at Eka Hospital in Addis Sheger. The odds of having good HHA with the motivator HH indication poster cues made HCPs 3.23 times more adhering (AOR = 3.38, 95% CI: 1.18-9.66) than those who had not. Having water for HH were 2.5 (AOR = 2.50, 95% CI: 2.20-11.78) times more and those who were promoted to HH by IPC committee were 4.2 (AOR = 4.2, 95% CI: 2.53-8.58) times more likely to have a good HHA to HH SP than those who were not (Tadesse et al., 2022). Among behavioral factors, in cross sectional study indicated only control beliefs (the degree to which a health professional believes that he/she holds access to assets/resources required to adhere to hand hygiene recommendations in various patient-care circumstances) were statistically significant. The useful control beliefs were 2.64 times more likely to predict HHA than the non-useful control belief categories (AOR = 2.64, 95%CI: 1.45-4.17) (Gobez Negash, 2014).

2.3. Healthcare Professionals' Perception towards Optimal Hand Hygiene

2.3.1. Healthcare Professionals' Perceived Barriers to Hand Hygiene Adherence

A cross-sectional study from University of Nairobi in 2014 exposed barrier to HH in the third world countries: inadequate knowledge, unfavorable attitudes, poor low-resource settings, environments and poor infrastructures making adherence to HH very difficult (Isanda, 2014).

2.3.2. Healthcare Professionals' Perceived Accelerators to Optimal Hand Hygiene

A Qualitative Study in US at Ohio State University, in year 2021 revealed that management practices and leadership behavior were related and critical to facilitate clinical infection prevention practices: these practices were characterized as important facilitators of HAIs prevention through: (1) engagement of executive leadership; (2) information sharing; and (3) manager coaching. It was found that accelerative factors such as: visibility of executive leadership as a role model, participatory goal-settings for HAIs prevention, efficient communication, and frequent opportunities to provide and promote learning from feedback were perceived to promote and sustain HAIs prevention efforts (McAlearney et al., 2021). A qualitative study that reviewed 10 HH papers in 2015, at University of Cork, Ireland indicated factors that facilitate HCPs HHA falling into 2 broad categories: motivational and perceptions of the work environment. The motivational factors include social influences or subjective norms, the acuity, self-protection, and use of cues reminders. Perceptions of the work environment include resources, information, guidelines and behavioral control beliefs (Smiddy et al., 2015). According to WHO (2009a) sound HH standard/policy enforces, motivates or facilitates HCPs: to have bare hands below the elbows to allow HH. Then awakens HCPs to wet hands under continuously running safe water, and use soap. They should position their hands so that water flows downwards away from the elbows in washing away germs to avoid contaminating the arms and hands again. They should rub hands well together. Then they should rinse their hands keeping all steps, thoroughly drying preferably using paper towels (Alcohol gel rubs follow the same sequence). According to MOH (2021) HH infrastructures that help facilitate level of HHA having the following core 6 six themes in place: 1. Accessible and functional HH supplies, including hand sanitizer dispensers with adequate supplies of ABHS, HH sinks, plain or antiseptic washing,

disposable or single-use towels and hand moisturizer that is compatible with other products and gloves, 2. Senior and unit-based leadership support that is responsible and accountable for adherence of frontline personnel, 3. Infection prevention personnel with training and resources to direct programs aimed at improvement of HH, 4.HCPs who have received training to recognize indications for HH throughout care episodes, 5.Trained observers to collect, evaluate and monitor, 6. Support for data analysis and communication (Coombes, 2015, FMOH, 2021).

2.3.3. Hand Hygiene from Knowledge, Attitude and Practice Perspective

A descriptive cross-sectional study in Dubti Referral Hospital in Afar in 7 May 2018 from 91 respondents, found out 60 (66.0%) of them were knowledgeable and 31 (34.0%) not knowledgeable about HH. However, their level of knowledge matched not their level of practice for 51 (56.0%) HCPs, had poor practice and 40 (43.0%) had good to HHA (Jemal, 2018). According to China's meta-analysis review in 2022 by Y. Wang et al (2022) in American Journal of Infection Control while facing COVID-19 pandemic, indicated HCPs adapted to HH. Attitudinal behavior, increased HH adherence following in 3 periods: 47% in pre-COVID-19 pandemic period, 79% in heightened awareness period, and 100% in strict precautions period ($P < .001$), under the influence of COVID-19, HCPs have a strong sense of perspectives of self-protection and control. Before and during pandemic, HHC rate was 71.65% versus 84.16% ($P < .001$). Therefore, this indicates HH adherence more motivated by perceived moments of outbreak disease than to HH standard or policy. It seemed as if HCPs have not attached worth to HH policy to be effective. For effective HH policy, either enforce or initiate to make HCPs understand the standard HH Policy to own it, then it persuades HCPs on duty to be self-motivated or encouraged to practice 5 key HH moments and techniques. A cross-sectional study in Gondar primary Hospital showed that 54.6% HCPs had had positive attitude towards HH standards and the remaining had negative attitude towards HHS or policy (Engdaw et al., 2019). Another cross-sectional study in Public Hospitals of Addis Ababa in 2020 found out that 116 (67.4%) (95% CI 25.6- 39.5) of the workers had a favorable attitude towards HHS protocol for infection prevention, while, 56 (32.4%) of workers had unfavorable attitude. their mean score being 53.5 (SD ± 10.0) out of 75 total score (NESRU, 2020.). Therefore, in sum, enhanced performance of HH associated is expressed as a function of relationship in algebraic terms as $f(i,o)$ where "i" is individual perspectives, and "o" stands for organizational safety or behavioral control. These

independent variables help modify HH behavior-practice to systematically adapt to meet the desired HH standard-policy.

2.4. Conceptual Frame Work

Synthesized literature review summary of the independent explanatory variables that help modify or influence the HH behavior-practice to adapt to the desired HH Standard outcome.

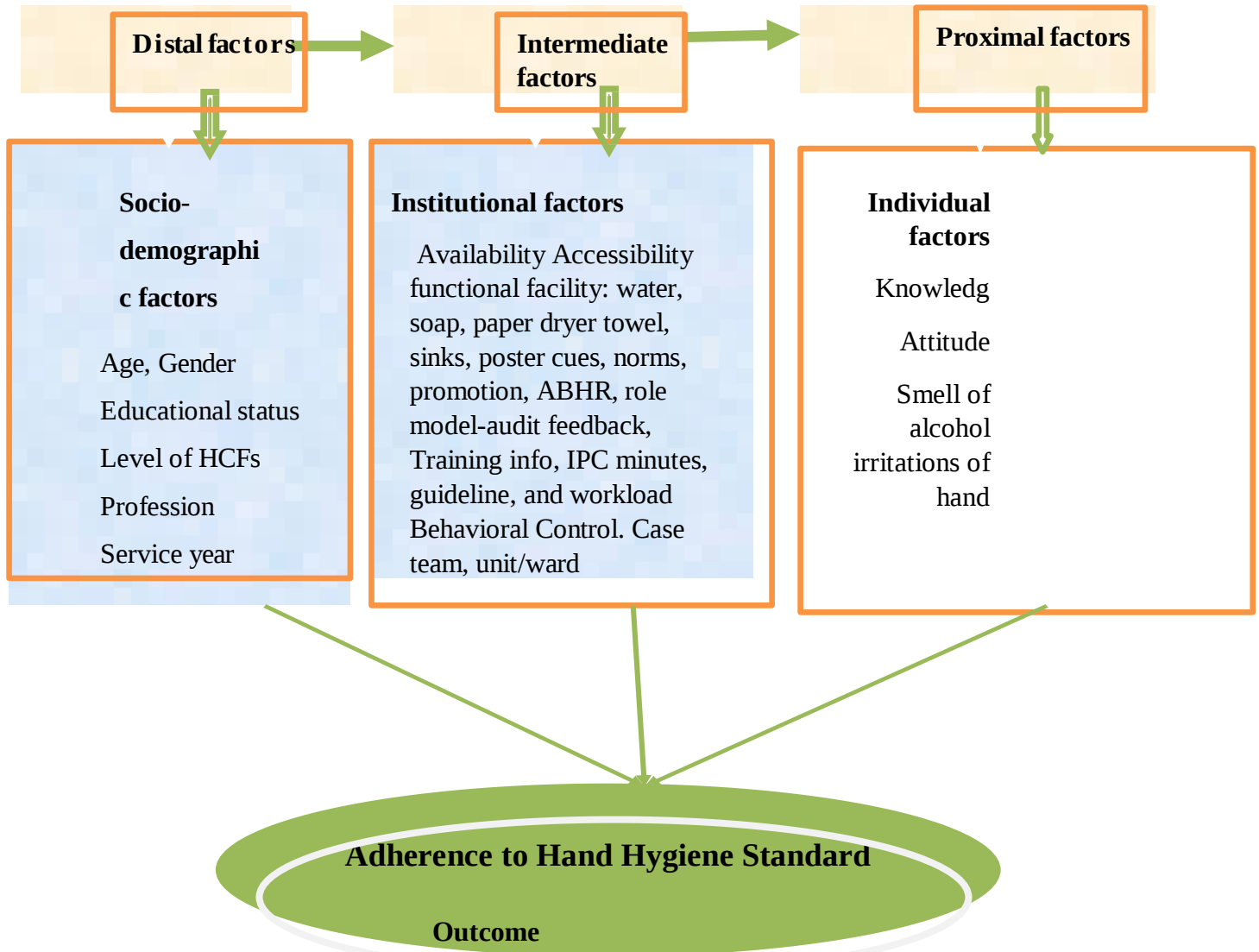


Figure: 01 Conceptual Framework of HCPs Adherence to HH SP Constructed by the investigator from readings of different literatures (Staniford et al, 2020).

3. METHODS AND MATERIALS

3.1. Study Area and Period

This study was conducted in the selected Miesso and GumbiBorde Agro-pastoral Woredas of West Hararghe Zone (WHZ), Oromia, Eastern Ethiopia. The Zonal Chiro town of West Hararghe Zone (WHZ) is located in Eastern part of Oromia, Ethiopia, which is about 300 km to the East of Capital City of Ethiopia. Among other Woredas, WHZ has 4 agro pastoral rural Woredas namely: Miesso, Burkadintu, Hawwigudina, and Gumbi Boredde. Of these, the two selected Woredas composed of all seven healthcare facilities (six health centers and one primary hospital). A mix of agricultural and pastoral livelihoods characterizes these woredas. These Woredas were chosen for characteristically embody the agro-pastoral qualities of the Zone to a highest degree. The study was undergone from Augst 25 to September 15, 2024.

3.2. Study Design

This study employed an institutional-based cross-sectional study supplemented by qualitative study, specifically the embedded mixed-method study design (CRESWELL., 2014)

3.3. Population

3.3.1. Source Population

The source population were all healthcare professionals. Those HCPs who were permanent employees in all healthcare facilities in Miesso and Gumbibordede Agro-pastoral Woredas' of West Hararghe Zone (WHZ).

3.3.2 Study Population

All HCPs, working in all selected public healthcare facilities during data collection period.

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion Criteria

All eligible Healthcare professionals working in healthcare facilities in the selected Woredas.

3.4.2. Exclusion Criteria

HCPs found in the HCFs for practical attachment, newly recruited staffs, uncooperative or not consented HCPs to participate in the study during data collection and staffs that were not available in healthcare facilities due to different reasons including a permitted leave during data collection period were excluded from this study.

3.5. Sample Size Determination

3.5.1. Sample Size Determination for First Objective

A sample size of healthcare professionals could be determined using a single population proportion formula was used to calculate sample size by considering $P = 0.37$ from the previous cross-sectional study conducted at 95% CI and 5% of the degree of precision that was 37.4% [95% CI (0.33, 0.42)] (Umar et al., 2022). The sample formula:

$$n = \frac{z^2 p (1-p)}{d^2}$$

$$\text{Thus, } n = \frac{1.96^2 \times 0.37 \times 0.63}{(0.05)^2}$$

Where n = sample size required $z = 1.96$ (normal deviate corresponding to 95% confidence interval) d = degree of precision, P = proportion of hand hygiene adherence and correction formula $nf = n/[1 + n/N]$. However, preferably sample $n = N$ = total HCPs = 156 were taken available for the study.

3.5.2. Sample Size Determination for Second Objective.

Factors associated with adherence to optimal HH could be calculated using double population proportion formula. For the fact that not finding HH study on health centers, at this lower tier, obliged the researcher for using double proportion, which is a maximum at 50% two sample proportions ($p_1 = p_2 = 0.5$). Considering factors that were significantly associated with the outcome variable, two-sided confidence level at 95%, the margin of error at 5%, power of 80% and the ratio of exposed to unexposed 1:1. Since the total HCPs working in those selected Agro pastoral Woredas HCFs were smaller than 10,000; the sample size needed to be adjusted by using finite population correction formula, sample size $nf = n/[1 + n/N]$. The difference between

the proportions that this study wants to detect at either 10% or 5%. For a significance level (α) of 0.05, Z1 is approximately 1.96. For a power of 0.80 ($\beta = 0.20$) and Z2 is approximately 0.84.

$$n_i = \frac{(Z_1 + Z_2)^2 * 2p(1-p)}{\Delta^2}$$

$$n_i = \frac{(1.96 + 0.84)^2 * 2(0.5)(0.5)}{0.1^2}$$

N= total healthcare professionals =156. For n_i = initial sample size=392, the final sample size $n_f = n/[1 + n/N]$ was **nf** at 5% produced $n_f = 136$ at 5% produced the $n_f = 136$. **However, for this study taking all 156 HCPs** is better than calculated n_f . **This** sample size is larger than cross-sectional study done in Dubti Referral Hospital in Afar in 2018 using a sample size of only 91 respondents (Jamal, 2018) and also than that of cross-sectional study conducted in Kenya with only 80 participants (Mudi, 2021).

3.5.3. Sample Size Determination for Third Objective

Determining the sample size for a qualitative study, involved several considerations: The key points guided sample size determination here were: Purpose of the Study, Homogeneity versus Heterogeneity, methods and practical/logistical factors. For this study exploring barriers and facilitators to hand hygiene adherence using interview method, started temporarily with eight sample size. As new themes appeared, considered adding more up to upper limit of interview participants until when no new themes continued to emerge **the final sample size became 12 for the third objective reaching saturation point**. Ultimately, the key here was to prioritize depth and richness of data over quantity to capture a comprehensive understanding of the topic. As for quantitative data n_f = final sample size to be N= total HCPs =156 all HCPs were used.

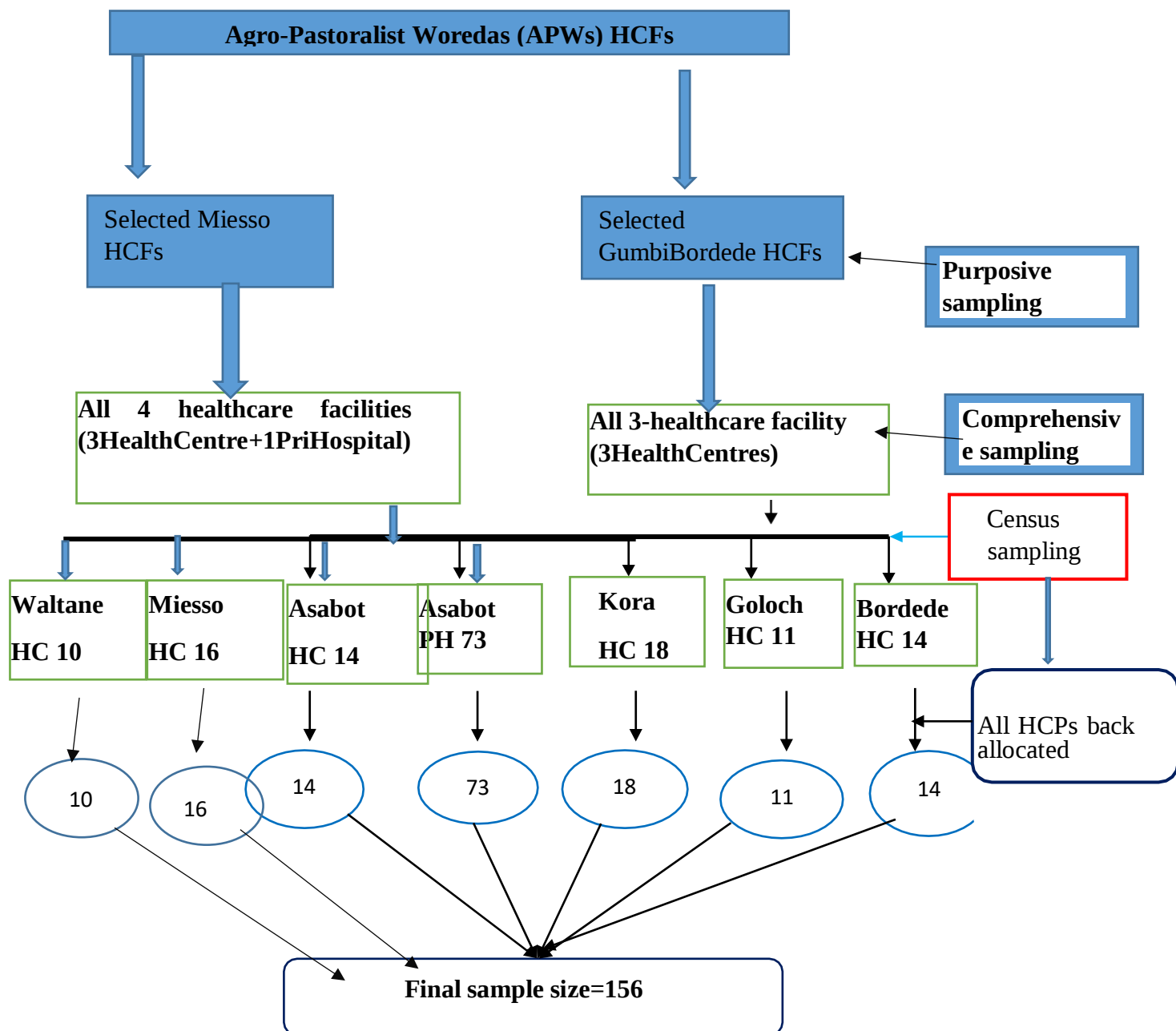
3.6. Sampling Procedure and Technique

From the four agro-pastoral Woredas in West Hararghe Zone (WHZ), two Woredas were selected purposively representing 50% of the agro-pastoral Woredas in the area. The selected Woredas were Miesso, which is the oldest established agro-pastoral district, and GumbiBordede, the newest and youngest Woreda administratively recently established. Health institutions are an open system highly affected by dynamism and surrounding environment. Selecting Woredas

with prominent agro-pastoral characteristics aimed to had better understand HH practices among HCPs serving these communities. In addition, the accessibility of these Woredas were also be a deciding factor for selection. Overall, strategically selecting Woredas with varying histories but shared agro-pastoral attributes can provide a diverse range of perceived perspectives from healthcare staff and help gained meaningful insights. **The procedure:**

For quantitative component, due to manageable number of HCPs in these agro-pastorals districts, taking all 7 HCFs and all HCPs 156 (100%) were preferred and taken into this study using stratified comprehensive sampling method.

For qualitative narrative inquiry: purposive maximum variation sampling technique (for diverse views) was used to recruit twelve 12 participants for the in-depth interviews to gather variation in views across departments from HCFs heads to HCPs and from office to health centers. Qualitative narrative inquiry focusing on collecting and analyzing personal beliefs or accounts from individuals provided insights into personal perceptions, motivations and barriers. The Purposive Sampling technique where HCPs were selected based on specific characteristics relevant to the study have had an application for researcher selecting HCPs who did have varying levels of HHA to explore diverse perspectives on HH to understand how context influence HHS.



Where key: HC is health center, PH is Primary Hospital, APWs is Agro-Pastoralist Woredas HCFs is healthcare facilities.

Figure: 2. Comprehensive Sampling procedure HCPs on HHA and associated factors HCFs in Agro-pastoral Woredas of West Hararghe Zone, Eastern Ethiopia, 2024.

3.7. Data Collection Methods

3.7.1. Data Collection Tools/Instruments

The primary data were collected using pretested self-administered structured questionnaires and complemented by semi-structured interviews, facility survey and field notes. Some of the questionnaire items were adapted from WHO multimodal HH improvement assessment tool (WHO, 2009a, WHO, 2009b), but most items adapted and modified from different literatures and from planned theory. It was used to develop the standard self-administered questionnaire. The questionnaire was customized to assess current HHA and associated factors. It included: HH knowledge, attitude and items of HCF survey assessment checklist using components of multimodal HH improvement. The HCPs perceptions and associated factors to HHS were gained via 5-point Likert scales items.

In addition to the structured questionnaire, for qualitative study an in depth-interview were considered to assess the underlying perceived perspectives of HHA for in-depth understanding perception towards HHS. The qualitative data complemented and explained HH questionnaire self-reported HHA. An in-depth one on one interviews was done using semi-structured standardized guides to ensure consistency while allowing for probing emerging themes. It was conducted to gain experience from HCPs, IPCC and an expert to examine their views on HH standard practices. Field notes and facility review survey tools from WHO multimodal was taken to document contextual factors, such as the availability versus accessibility of HH infrastructures, policy documents and workflow patterns, which may influence HHA.

3.7.2. Data Collectors and Supervisors

The data were collected by three trained personnel of bachelor's degree holder using structured self-administered questionnaires and interview checklist and it was supervised by two supervisor having degree or above including principal investigator.

3.7.3. Data Collection Procedure

Data were collected for nearly 3 consecutive weeks by trained collectors. At first, field observation notes and facility survey were made using WHO Healthcare Facility HH self-assessments survey tool, then, self-administered questionnaires were given to all HCPs during

each shift after obtaining written informed signed consent. In parallel, principal investigator gathered qualitative data through key informants with his aide. The pre-tested standardized questionnaires were given for the respondents one 1 hrs.' before the end of the regular working hours. Trained data collectors collected the filled questionnaires before the respondents leave the unit. For HCPs who were on the shift the questionnaires were given at their shift time and get collected back after an hour. For those who needed more time to take home the questionnaire, it was allowed after exchange of contact address for reminders so as to increase attentiveness and response rate of questionnaire.

3.8. Study Variables

3.8.1. Dependent Variable

HCPs Adherence to hand hygiene standard precaution (Yes/No).

3.8.1. Independent Variables

Socio demographic factors: age, gender, work experience, educational level, level of health facility, professional category.

Individual Factor: HH knowledge, smell of alcohol, irritation of HH, perspectives of HCPs attitude towards HH SP and items of theory of planned behavior.

(Physical /Institutional factors): Availability versus accessibility of functional HH facilities: soap and water, ABHR, sink with running water, training on HH, Info, presence of IPCC, motivator-reminder cues posters, HH policy or IPC protocol, audit-monitor role model, feedback, HH promotion, case team ward and items of WHO multimodal hand hygiene components.

3.9. Operational Definitions

The following terms and variables defined operationally below:

HH Adherence to Standard: according to WHO, the minimum standard for HH adherence (HHA) rate to be at 80% with a stretchable target of 100% HHA is regarded as desirable or good. 80% and above HHA is considered as having excellently acceptable HH adherence to standard precaution cited in (FMOH, 2012, UNICEF, 2021). HH Adherence rate below 60% generally indicates the need for improvement considered as poor adherence to HH standard precaution and

excellent if greater than 90%. In some studies, HHA rates between 60% and 80% classified as moderate, indicating that there is room for improvement but there is also some HHA.

However, here for this study, it measured Likert scale responses with "Never", "Rarely", "Often", "Very Often", or "All the Time", which correspond to scores of 1, 2, 3, 4, and 5, respectively. It was summed up, transformed, and dichotomized. Specifically, responses of 1, 2, or 3 were transformed into "no" HHA, while responses of 4 or 5 transformed into "yes" HHA.

Knowledge: the knowledge of HCPs was measured on HHS. All correct answers with score of >50% were considered as good knowledge but with score of less or equal to (50%) were taken as having poor knowledge (WHO, 2009b, Ahmed et al., 2020, Geberemariam et al., 2018).

Attitude towards HH standard precautions: -Attitude is an evaluation of belief and intention to follow the principles of HH standard precaution by HCPs, it was assessed using Likert's scale or degree of agreement response: strongly disagree, disagree, neutral, agree and strongly agree to measure the attitude. These responses will then be dichotomized: strongly disagree, disagree and neutral responses were categorized as 'disagreed response' while other strongly agree and agree response's classified as 'agreed response.' Then the responses greater than the average score or above 50% implied as positive/favorable attitude, and score equal or below 50% were regarded as having negative/unfavorable attitude (WHO, 2009b, Douno et al., 2023, MUDI, 2021).

Agro-Pastoralist Woredas (APWs) are administratively established districts characterized mostly by mixed agro pastoralists' socialization and mainly living on animal rearing.

HCPs: - who do have educational status of diploma, degree and above physician (internist, general practitioner, radiologists, and surgeon), nurse, laboratory, midwifery, anesthetists, and pharmacy contacting with patients, blood and body fluids by the virtue of their duties.

Standard is concerned with standard precaution: a set of safety standard practices by HCPs set in infection prevention and control **protocol** that was used to guide the prevention of the transmission of disease that can be acquired by contact with blood and body fluid on skin (including rashes) and mucus membranes as measured through the level of adherence rate. (WHO, 2009b, FMOH, 2012).

Subjective norm: shows a health professional perception of social normative pressures. HCPs said to have supportive subjective norm towards hand hygiene adherence if his/her subjective

norm “Agreed” construct items score were above average 50% of all Likert items under the subjective norm category (Gobez et al, 2014).

Behavioral Control beliefs: measures the degree to which a health professional believes that he/she holds access to resources or perceived personal beliefs required to adhere to hand hygiene recommendations. HCPs said to hold no-perceived difficulty or useful control beliefs towards hand hygiene adherence if his/her control belief “Disagreed” Likert scale scores were above average 50% of all Likert items under the control belief category (Gobez et al, 2014).

Perspectives refer to the frame of reference from which an individual or group of HCPs perceives events, or situations that opted in shaping how HCPs view, interpret and make sense of the working environment as it is mostly measured by scales of planned behavior/attitudes (2009a, 2009b, Mudi, 2021, Douno et al., 2023).

3.10. Data Quality Control

In order to assure the data quality, one day training was given for the 3 data collectors and one supervisor on the data collection tool, data collection procedure, on the aim of the study and on confidentiality of the collected data. The training also oriented the ethics, the initial and end of the data collection period, wisely using of time, data handling. Besides, how to submit the collected data to the standard. The questionnaires were prepared in English and translated to Afan Oromo and the Oromiffa questionnaire back translated into English to compare the content and their meanings. This was made for HCPs to provide them with the more understandable alternative language to fill the questionnaire, hence most HCPs having educational level of degree preferred the English version and most HCPs those with diploma preferred the Afaan Oromoo version questionnaire. This questionnaire distributed to HCPs along with new pen costing more than three thousand birr in total because of three main purpose: first for HCPs to avoids waiting line in search for pen, second to prevent cross-contamination when exchanging or borrowing pen and lastly as incentive to immediately and attentively fill the questionnaire. Further, the data collectors clarified the matter in close proximity. During data collection period, the supervisor monitored the data collection process, and checked for the completeness and logical consistencies of the data collected and gave an appropriate feedback. Supervisor and principal investigator made intensive supervisions. Data double entry was done with data clerk and an investigator to resolve errors immediately.

To ensure validity, the questionnaires were developed based on established HH guidelines and the tested conceptual and theoretical framework. The standardized validated questionnaires were also refined contextually based on feedback from experts and HCPs. Reliability was assessed using appropriate statistical measures of the Likert items internal consistency of Cronbach alpha pretested the study found out to be on average > 0.91 showed that being in a very good range. It was conducted on 5% (8) of HCPs personnel at Chiro HCFs, then after, correction of questionnaire were made based on the result.

The quality of data in the qualitative study was maintained through careful preparation and extensive practice with a topic list. This included recognizing possible challenges in the interview process, like unclear questions, personal biases or technical issues. Additionally, employing Thick Description—offering comprehensive and detailed accounts of the context, following a structured data analysis method such as thematic analysis that contributed to the study's rigor. Triangulation, further help boosted the credibility of the results by integrating interviews, observations, and document reviews that enhanced the reliability and validity of the qualitative data.

3.11. Methods of Data Processing and Analysis

After data collection, data were checked for completeness. It was edited, cleaned, coded and then the data were entered into Epi info software (version 7.2) with data clerk, after that, it was exported to Stata (version 17) for further data cleaning and analysis. In addition, frequencies were run to check for any missing values accordingly. The outcome variable was summarized and coded accordingly. If the response indicated good adherence (yes), it was coded as 1. Conversely, if the response indicated poor adherence (no), it was coded as 0. To calculate the mean score for HHS adherence, participants were asked to indicate their level of adherence HHA in various indications responding with "Never", "Seldom", "Often", "Very Often", or "All the Time", which corresponded to scores of 1, 2, 3, 4, and 5, respectively. During the analysis, it was summed up, transformed, and dichotomized. Specifically, responses of 1, 2, or 3 were transformed into "no" to HHA, while responses of 4 or 5 were transformed into "yes" to HHA.

Items of associated factors extracted from WHO Hand Hygiene tools and items from the theory of planned behavior were designed in a five-point Likert scale to measure attitude, subjective

norm and behavioral control, HH policy adoption and HH institutional factors. In this way, the response categories “strongly agree” and “agree” were grouped as “Agreed” as well as “strongly disagree”, “disagree” and “neutral” were grouped to “Disagreed” for the sake of analysis and easy interpretation. All negative items responses were reversed and each item was recoded and transformed. Finally, it was transposed and dichotomized before analysis. It was calculated by taking the average of the sum of the scores as a cutoff point while dichotomizing the totals.

Descriptive analysis was done by computing proportions and summary statistics. Then, the uni-variable information was presented by using frequencies, summary measures, tables and figures. All assumption tests including multi-collinearity was checked to see the linear correlation among the independent variables by using correlation matrix to identify pairs of variables that were highly correlated. High correlations (e.g., above 0.7 or 0.8) indicated multicollinearity; hence, age and age groups were evicted from the multi-variable analysis. Chi-square tests or Fisher's exact tests for fewer cells were conducted to explore the association between HHA and categorical variables in bi-variable analysis. The Hosmer-Lemeshow model fitness test indicated how well the observed and predicted values fit with each other, hence, insignificance of its p-value > 0.087 declared being a good model. Logistic bi-variable analysis were done to see the crude association between each independent variables and outcome variable. Likewise, bi-variables with p-value ≤ 0.26 were taken into the multivariable model to control for all possible confounders and for stability. Whereas, the multivariable logistic regression was performed to identify factors associated with HHS adherence. The direction and strength of statistical association between outcome and independent variables were measured by odds ratio with 95%CI to identify predictors for HH Standard Precaution and their statistical significance were declared at p-value < 0.05 .

Qualitative Component: the semi-structured interviews was done to identify the key experience and domains influencing HH. Thematic analysis was used to analyze the qualitative data, with the identified concept coded to themes that narrated to the relevant conceptual domains for either explanation, affirmation or supplementation of quantitative data.

3.12. Ethical Considerations

Ethical clearance and approval was obtained from Haramaya University, College of Health and Medical Science's Institutional Health Research Ethics Review Committee as protocol of the study (Ref. No: IHRERC/028/2018) stated before the commencement of the study. Official letter of cooperation was submitted to concerned bodies to obtain their collaboration and facilitation. Firstly, describing the study's aims then the informed, voluntary, written, and signed consent were obtained from all participants and institutions ensuring their confidentiality and anonymity throughout the research process. Participants were assured to have the right to withdraw from the study at any time without any consequence.

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4. RESULTS

4.1. Socio Demographic Characteristic of the Study Participants

Out of 156 healthcare professionals (HCPs) 141 were involved in this study making 90.4% response rate. The mean age of the study participants was 28.5 and (SD $\pm$ 4.5) years, ranging from 21 to 48 years old HCPs. Nearly half of the respondents had less than 69 (48.9%) 3 years of work experience. 74 (52.5%) of HCPs were nurses and 96 (68.1 %) were males (table1).

Table: 1:Socio-demographic characteristics of HCPs in Public healthcare facility in Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia, 2024 [n=141].

Demographic Variables	Frequency	Percentage
Sex		
Male	96	68.09
Female	45	31.91
Age category		
20-25	30	21.28
26-30	82	58.16
31-35	19	13.48
>36	10	7.09
Types of profession		
Physician and Health Officer	16	11.35
Nurse	74	52.48
Midwifery	20	14.18
Laboratory/Radiology	15	10.64
Pharmacy and others	16	11.36
Educational status		
Diploma	64	45.39
Degree	77	54.61
Experiences		
0.5-3 years	69	48.94
4-10 years	63	44.68
>10+ year	9	6.38
Departments		
Maternal & child health	35	24.82
Inpatient department	12	8.51
Emergency and Operation room	24	17.0
Outpatient OPD	37	26.2
Laboratory	15	10.6
Others (ambulatory, pharmacy...)	18	12.7

4.2. Healthcare Professional Related Factors

4.2.1. Attitude towards Hand Hygiene.

This finding revealed that HCPs disagreed the opinion that it is not hard to do regularly hand hygiene at point of care 99 (70.21%). HCPs showed a notable increase in HHA during outbreaks, for largest 123 (87.23%) HCPs disagreeing with the statement that they “adhere to HH standard as often during outbreaks as normal/ calmer situations at point of care.”

Table 2: HCPs’ Attitude towards Hand Hygiene in Healthcare Facilities of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

ATTITUDINAL PERSPECTIVE	ATTITUDE CATAGORY			
	DISAGREED		AGREED	
	Freq.	%	Freq.	%
It is not hard to regularly do hand hygiene at point of care though patients take priority	99	70.21	42	29.79
Adherence to hand hygiene whenever recommended would not mean loss of valuable time to me.	75	53.19	66	46.81
There is no written proof as to the usefulness of hand hygiene.	55	39.01	86	60.99
I take pride in doing hand hygiene.	72	51.06	69	48.94
Doing hand hygiene gives me self-satisfaction.	50	35.46	91	64.54
Doing hand hygiene has become my personal habit.	82	58.16	59	41.84
I adhere to moments of hand hygiene as often during outbreak as when it is assumed normal calmer at point of care.	123	87.23	18	12.77
A co-worker who examines a patient with VRE/germs and then uses my pen without proper hand hygiene is likely to transfer germs to my pen.	71	50.35	70	49.65
If I do not engage in hand hygiene, I may be infected.	57	40.43	84	59.57
Hand hygiene effectively reduces the incidence of disease from healthcare associated infections.	59	41.84	82	58.16
If I miss out hand hygiene, I may be subject to administrative/disciplinary action.	82	58.16	59	41.84
Washing hands more often cause skin irritation.	107	75.89	34	24.11
I do rub my hands more often because I do like the smells of an alcohol.	93	65.96	48	34.04
Hand washing is less preferred to me than alcohol-based hand rub in healthcare.	115	81.56	26	18.44
I do comply to hand hygiene more often at point of care even if the threat of Covid-19 do not exist.	101	71.63	40	28.37
Hand hygiene policy has positively influenced the level of adherence to hand hygiene standard in my healthcare facility.	104	73.76	37	26.24

Additionally, about 60.9% of HCPs agreed with the assertion that "There is no written proof of the usefulness of HH," that is 39.1% disagreed showing skepticism doubt. In terms of whether HH conditioned as a habit, the majority 82 HCPs (58.16%) disagreed with this statement "Doing hand hygiene has become my personal habit." Furthermore, 107 HCPs (75.9%) disagreed with the idea that "washing hands more frequently leads to skin irritation." Besides, 101 expressed the belief that HH adherence was primarily motivated by fear of pandemic that is the presence of a COVID-19 threat (71.63%) HCPs. Regarding perceptions of HH policy, a proportion of 104 HCPs (73.76%) disagreed that hand hygiene standard positively influenced HH adherence levels, viewing such HHS policy as more rhetorical than significant. Overall, the average favorable attitude towards hand hygiene standard was measured at average of 40.4 with a standard deviation of 8.2 (table.2) above.

4.2.2. Level of Knowledge Regarding Hand Hygiene.

Knowledge could influence adherence to HHA: Highest percentage of incorrect responses of items that indicated knowledge gap were on multiple choice of 3 items:

The first was, "which of the following infections can be potentially transmitted from patients to clinical staff if appropriate glove use/HH are not performed" with 132 (93.3%) incorrect answers, the second item was, 132 (93.3%) "Which of the following can be achieved by antiseptic hand rubbing?" the third item was "Which of the following hand hygiene actions prevents transmission of germs to the patient." With incorrect responses of very incredible 130 (92.2%) wrongly identified HH actions that prevent the transmission of germs to patients. Lowest incorrect/highest correct answer was identified by HCPs on items "Hand washing and alcohol-based hand rubs are performed in sequence one after the other and Hand washing has more procedural steps than alcohol-based hand rubs" 50 (35.5%) see (table 3) below.

Table 3: Healthcare Professionals' Knowledge level regarding Hand Hygiene Standard in Healthcare Facilities of Mieso and Gumbi Boredede Woreda of WHZ, Ethiopia 2024 [n=141].

KNOWLEDGE DOMAIN	RECODED CATEGORY Incorrect /correct Answers			
	CORRECT		INCORRECT	
	Freq	%	freq	%
Are you familiar with the contents of hand hygiene guideline?	54	(38.3)	87	(61.7)
Do you know the 5 key moments for hand hygiene indications?	51	36.2	90	63.8
Do you know the methods/ modes of hand hygiene?	72	51.1	69	48.9
Do you know the percentage of hospitalized patients due to healthcare associated infection according to recent studies?	40	28.4	101	71.6
Do you know the level of HCPs hand hygiene adherence in your facility?	33	23.4	108	76.6
Is Hand washing more important than the subsequent hand drying?	39	27.7	102	72.3
Washing hands with soap and water more advised than alcohol-based hand rub in healthcare facility.	33	23.4	108	76.6
HW and alcohol-based hand rubs performed in sequence one after the other	91	64.5	50	35.5
Hand washing has more procedural steps than alcohol-based hand rubs.	91	64.5	50	35.5
Nail polishes, rings, artificial nails or extenders increases likelihood of colonization of hands with harmful germs.	16	11.3	125	88.7
Clostridium difficile (the cause of antibiotic-associated diarrhea) is readily killed by alcohol-based hand rub.	24	17.0	117	83.0
Alcohol-based hand rubs have excellent antimicrobial activity against bacterial spores.	26	18.4	115	81.6
Wearing gloves can substitute hand washing.	92	65.2	49	34.8
Do you know the CASH (clean and safe health facility) program in HCF?	38	27.0	103	73.0
Which of the following hand hygiene actions prevents transmission of germs to the patient?	11	7.8	130	92.2
Which of the following hand hygiene actions does not prevent transmission of germs to the healthcare professionals?	26	18.4	115	81.6
Which of the following pathogens readily survive in the environment of the patient for days to weeks?	79	56.0	62	44.0
Which of the following infections can be potentially transmitted from patients to clinical staff if appropriate glove use/HH are not performed?	9	6.4	132	93.6
Which of the following can be achieved by antiseptic hand rubbing?	9	6.4	132	93.6

4.3. Perspectives of Behavioral Factors towards Hand Hygiene Adherence

Below, described was responses of healthcare professionals (HCPs) regarding their adherence to HHS through the lens of two key psychological behavioral constructs: The Subjective Norm and Perceived Control Belief.

4.3.1. Subjective Norm Perspective

Here, the subjective norm items revealed that HCPs largely do not feel influenced by their peers or by their patients notably among HCPs in these agro-pastoral Woredas HCFs settings. For there was higher percentage of disagreement as to my peers appreciate good hand hygiene by peers 93 (66%) towards HHS (table.4).

Table 4: Heath Professionals' Subjective Norm towards Hand Hygiene in Healthcare Facilities of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]

Subjective Norm Perspective	Disagreed		Agreed	
	N0	%	N0	%
Behavior of my colleagues influence the frequency of my hand hygiene practice.	81	57.4	60	42.6
My peers appreciate good hand hygiene practice.	93	66.0	48	34.0
Patients expect health professionals to practice hand hygiene regularly.	81	57.4	60	42.6
I am motivated to adhere sustainably to hand hygiene standard in order to protect my patients and myself.	89	63.1	52	36.9

4.3.2. Perceived Behavioral Control Perspective

Accordingly, as to the control belief, HCPs showed a much higher level of agreement regarding perceived behavioral control that could be barriers to optimal HH. The overwhelming majority of HCPs revealed that both unavailability and inaccessibility of HH products, equally affecting HHA, the highest challenge cited by 122 (86.5%) HCPs. The other items HCPs cited, as barrier to their optimal HHA was over-crowdedness-patient volume 109 (77.3%). Besides, 110 (78.0%) HCPs indicated they held a belief that healthcare facility design was interfered with/ barrier to optimal HHA. Lastly, 72 (51.1%) HCPs pointed out that with item “Higher level Hospital or Primary Hospital not supporting and capacitating their cluster health centers periodically.” in preventing HAIs through IPC in general and HHA in particular (table.5).

Table 5: Healthcare Professionals’ Behavioral Control belief perspective towards Hand Hygiene Standard in Healthcare Facilities of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

Perceived Behavioral Control Belief Perspective	Disagreed		Agreed	
	N0	%	N0	%
I do not wash hands more often for there is no water supply and soap in the facility.	60	42.6	81	57.4
I do hand hygiene less often due to the high number of patients/ overcrowd	32	22.7	109	77.3
I don’t practice hand hygiene more often since I forget to do it.	52	36.9	89	63.1
I don’t wash my hands more often because the sink is inconveniently located.	74	52.5	67	47.5
Not convenient healthcare facility design interferes with (barrier to) my optimal hand hygiene.	31	22.0	110	78.0
Unavailability of hand hygiene products interfere with my optimal hand hygiene.	21	14.9	120	85.1
Inaccessibility of hand hygiene products interfere with my optimal hand hygiene.	19	13.5	122	86.5
Higher level Hospital/ Primary Hospital not supporting and capacitating our health center periodically.	69	48.9	72	51.1

4.4. Healthcare Facilities-Related Factors to Hand Hygiene

4.4.1. System Change Component (Accessibility of Hand Hygiene Products-Facilities)

From the Fig.3 as seen below it can be said that most of the respondents agreed with lack of dedicated budget 83% HCPs, unavailability of HH products 78% HCPs and lack of paper/ sterile towels for hand drying 81.6% HCPs (Fig.3).

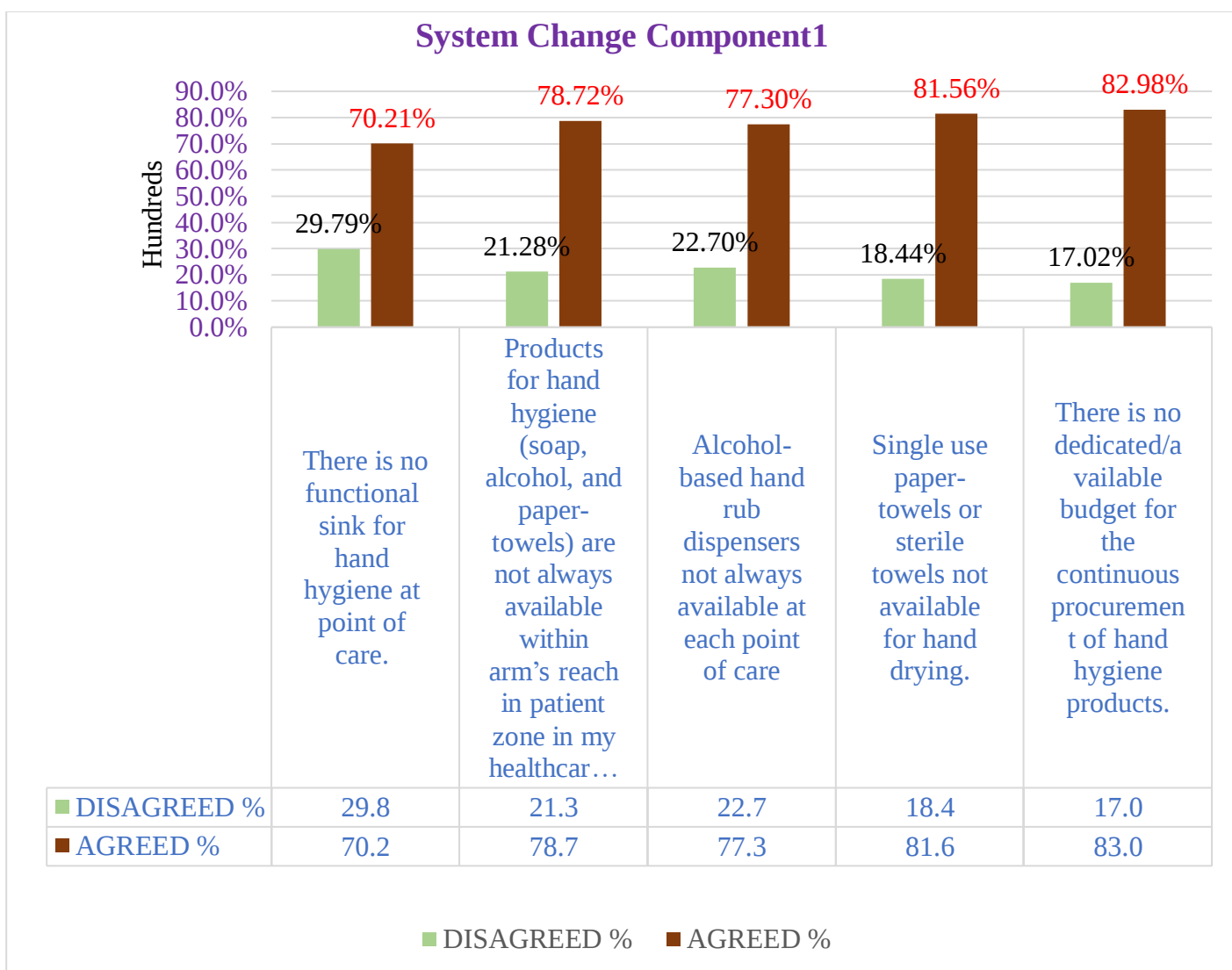


Figure.3: Items of System Change components of Hand Hygiene in Healthcare Facility of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=14]

4.4.2. Training and Education Component of Multi-Modal Hand Hygiene

From the Fig. 4, it can be said that most of the respondents agreed with lack of WHO guideline for HH nearly 66.7% HCPs and 58.2% HCPs agreed lack of training as depicted below.

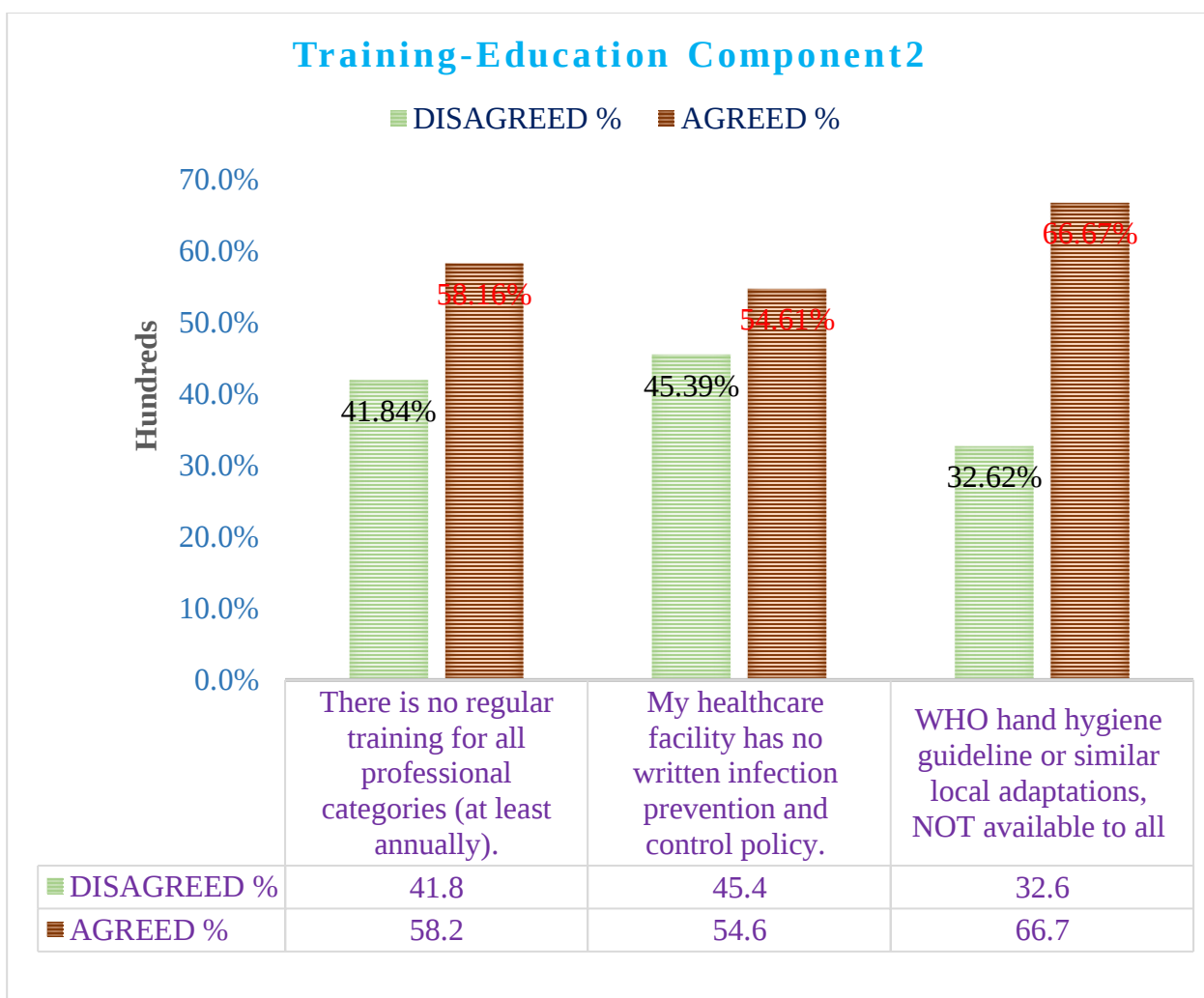


Figure 4: Training and Education components of Multimodal Hand Hygiene in Healthcare Facilities of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

4.4.3. Workplace Reminders Component of Multi-Modal Hand Hygiene

Regarding workplace reminders to Hand Hygiene Adherence 57.4% HCPs agreed absence of Workplace reminders-posters and alerts of Hand Hygiene (Fig.5).

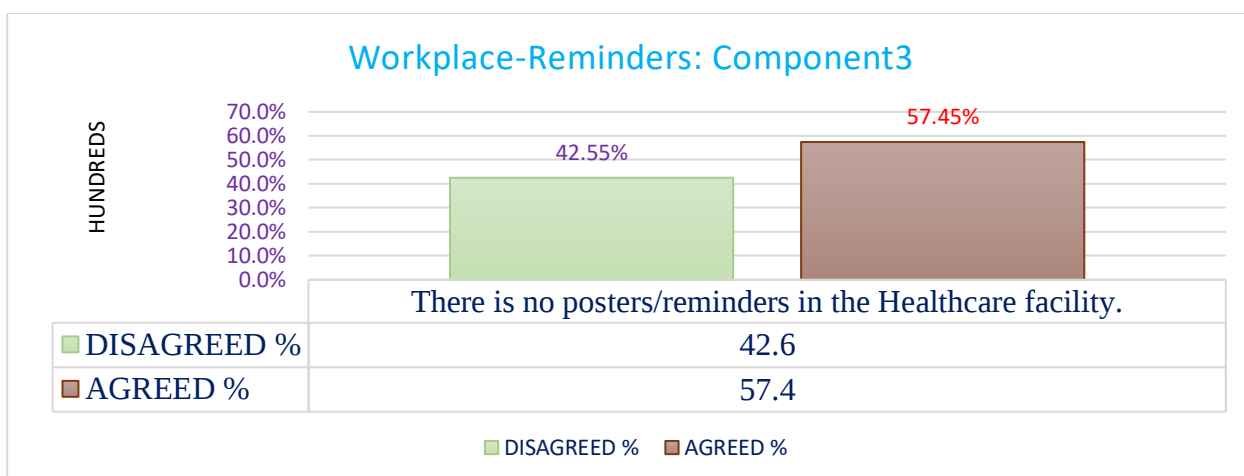


Figure 5: Workplace reminders of Hand Hygiene in Healthcare Facilities of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

4.4.4. Evaluation and Feedback component of Multi-Modal Hand Hygiene

Regarding Evaluation and Feedback related to Hand Hygiene, 80% HCPs agreed absence of Evaluation and Feedback on Hand Hygiene as seen below (Fig.6).

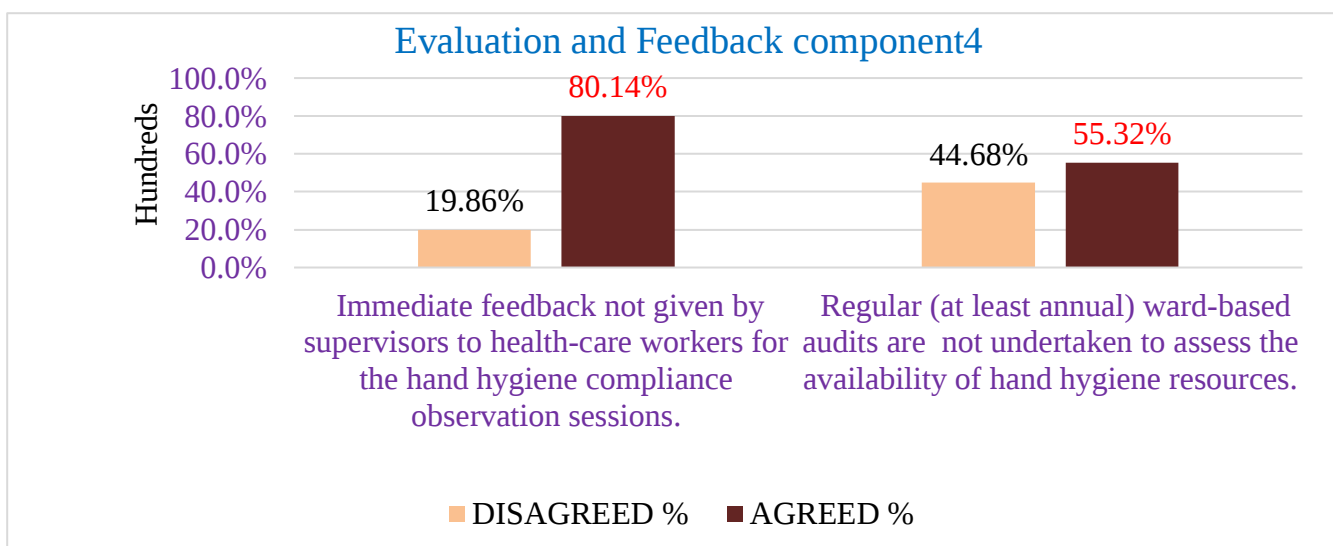


Figure: 6. Evaluation and Feedback on Hand Hygiene Standard in Healthcare Facility of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

4.4.5. Safety Climate Component of Multi-Modal Hand Hygiene

According to data analysis output, most HCPs 80.9% mentioned lack of encouragements and recognitions for hand hygiene champions to be role-model leaders (fig.7).

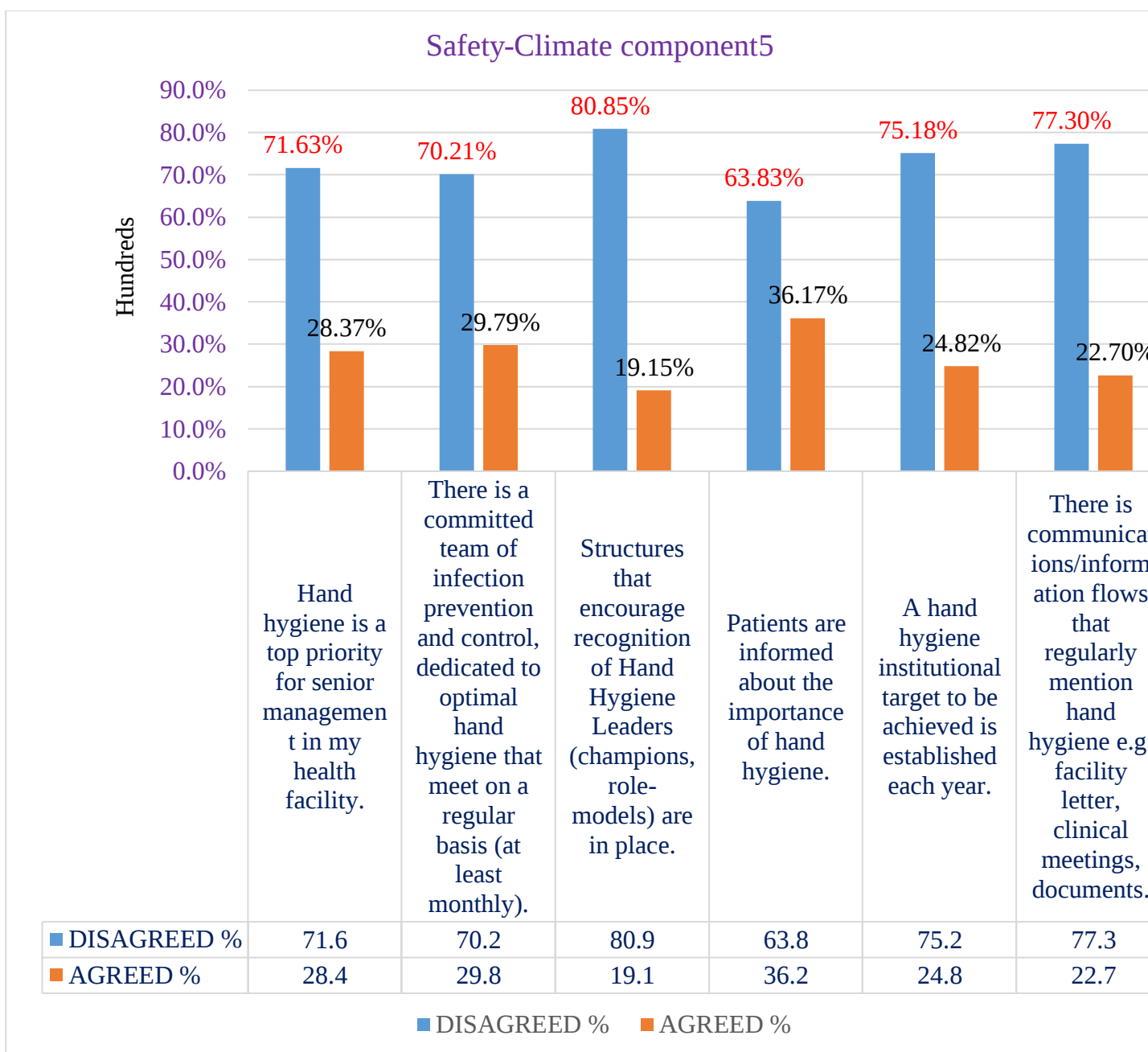


Figure 7: Safety climate/work environment level to Hand Hygiene in Healthcare Facility of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

4.5. Healthcare Professionals Level of Adherence to Hand Hygiene.

4.5.1. Adherence to Hand Hygiene Standard by Indicative Moments.

The HCPs self-reported level of adherence to HH standard practice showed that, HCPs “always” adhered to HHS during indicative moments of “after body fluid exposure 40 (28.4%) and after

visiting a toilet/ restroom within 5 meters 33 (23.4%)” answering response scales of “always”. The lowest “always” adhered to HHS appeared during indicative moments of “before patient contact, before putting on gloves and before entering patient exam room where scale responses category “always” had the minimum level of percentage: 9 (6.4%), 14 (9.9%) and 12 (8.5%) respectively compared to other indicative moments of hand hygiene practices (table.6).

Table 6: Healthcare Professionals’ level of adherence to Hand Hygiene Standard in Healthcare Facilities of Miesso and Gumbi Boarded Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

Hand Hygiene Indications:	<u>Adherence Level</u>									
	Never		Rarely		Sometimes		Mostly		Always	
	n0	%	n0	%	n0	%	n0	%	n0	%
Before patient contact.	22	15.6	56	39.7	44	31.2	10	7.1	9	6.4
Before clean/aseptic procedures	11	7.8	29	20.6	42	29.8	32	22.7	27	19.1
After body fluid exposure.	11	7.8	13	9.2	22	15.6	55	39.0	40	28.4
After contacts with patients.	21	14.9	48	34.0	29	20.6	20	14.2	23	16.3
After touching patient surroundings.	41	29.1	52	36.9	18	12.8	10	7.1	20	14.2
After touching potentially contaminated objects/knobs.	35	24.8	55	39.0	22	15.6	7	5.0	22	15.6
Before putting on gloves.	51	36.2	54	38.3	14	9.9	8	5.7	14	9.9
After removing used gloves.	30	21.3	56	39.7	33	23.4	9	6.4	13	9.2
Before entering patient exam room	49	34.8	51	36.2	19	13.5	10	7.1	12	8.5
After leaving patient exam room	23	16.3	52	36.9	33	23.4	20	14.2	13	9.2
After visiting a toilet/ restroom within 5 meters.	16	11.3	20	14.2	33	23.4	39	27.7	33	23.4

4.5.2. Overall Adherence to Hand Hygiene Standard

Likert items indicating 11 different circumstances / moments of indications measured adherence to HHS. These Likert items were recoded and transformed in such a way that the response category “mostly and always transposed to Yes-adherence”. While the other categories transformed into “No-adherence” hence forming binary variable. Accordingly, this study revealed that standard hand hygiene overall adherence found out to be 18% (95%CI: 12.2%, 24.9%).

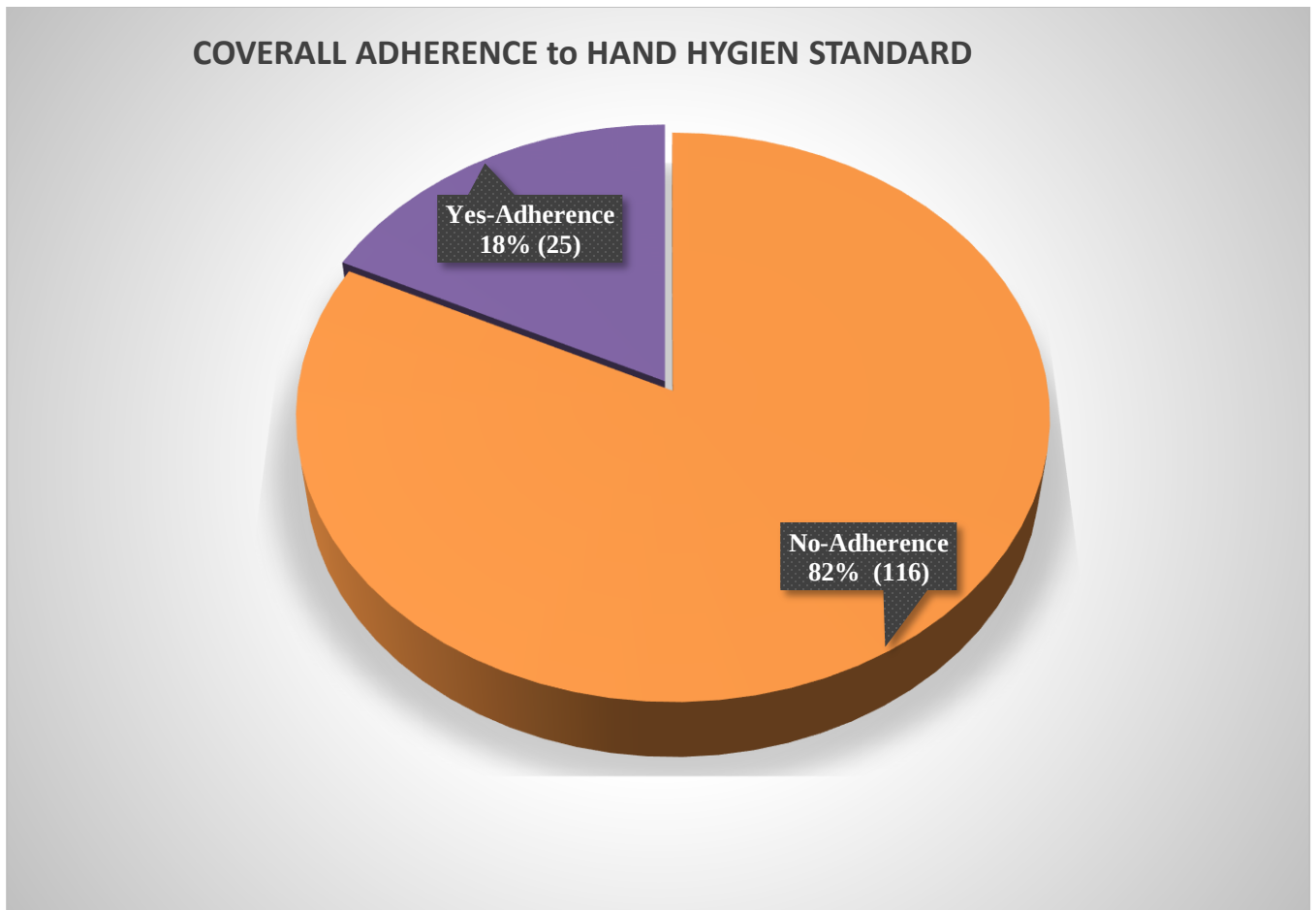


Fig 8: Overall Level of Adherence to Hand Hygiene Standard in Healthcare Facility of Miesso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]

4.6. Factors Associated with Adherence to Hand Hygiene

4.6.1. Bivariable Factors Associated with Adherence to Standard Hand Hygiene Practices

Bivariable logistic regression analysis was done for factors influencing Adherence to Standard Hand Hygiene (Table 7). Study variables with a p-value less than or equal ($p \leq 0.26$) were identified by Chi-square tests and/or used Fisher's exact tests for fewer cells having less or equal to 5 expected value to explore the candidate variables and the association between HHA and categorical variables. In bivariable analysis, the candidate variables fulfilling criteria were taken for multi-variable selection model. Hence, the identified candidate variables that showed an association ($p \leq 0.26$) with HH adherence were: access to WHO HH guideline, setting yearly HH

target/plan, Healthcare facility category, Workplace Reminders, Behavioral control belief, attitudes, Subjective Norm, System Change component (availability and accessibility of HH products and facilities), Knowledge and Safety climate. It was assumed that when conducting logistic regression analysis, one of the key considerations is ensuring the reliability of the model. A common rule of thumb is that each cell should have more than 5 observations per cells in each a 2 by 2 cell. This helps the estimates of the model parameters are stable and reliable (Table. 7).

Table 7: Bivariable factors associated with hand hygiene of HCPs in Healthcare Facility of Mieso and Gumbi Boredede Woreda of West Hararghe Zone, Eastern Ethiopia 2024 [n=141].

Explanatory variables	Adherence to HH Standard		p-value	COR (95%CI)
	Yes HH Adherence	No HH Adherence		
Access to WHO HH guideline				
Yes	13(28.3)	33(31.7)	0.026	2.8(1.13, 6.58) *
No	12(12.6)	83(87.4)		1
Attitudinal perspective				
Favorable attitude	19(34.55)	36(65.45)	0.00	7.1(3.2, 22.1) *
unfavorable attitude	6(6.98)	80 (93.02)		1
Subjective Norm Perspective				
unsupportive social influence	13(13.13)	86(86.87)	0.03	1
supportive social influence	12(28.57)	30(71.43)		2.6(1.0, 6.4) *
Behavioral control perspective				
Yes perceived difficulty	15(14.29)	96(85.71)	0.04	2.7(1.0, 6 .2) *
No perceived difficulty	10(31.03)	20(68.97)		1
Workplace Reminders				
Yes poster	15(30.61)	34(69.39)	0.05	3.6(1.479, 8.849) *
No poster	10(10.87)	82(89.13)		1
Evaluation and Feedback				
Yes feedback	15(21.74)	54(78.26)	0.26	1.7(.72, 4.23)
No feedback	10(13.89)	62(86.11)		1

...Continued Table 7.

Explanatory variables	Adherence to HH Standard		p-value	COR (95%CI)
	Yes HH Adherence	No HH Adherence		
Safety climate category				
Conductive	9(31)	20(68.9)	0.04	2.6(1.03, 6.92) *
Unconductive	16(14.3)	96(85.7)		1
System change category				
Unavailability of facility/ products	10(8.57)	96(91.43)	0.00	1
Availability of facility/ products	15(44.44)	20(55.56)		8.5 (2.31,4.81) *
Knowledge level				
good knowledge	11(34.38)	21(65.6)	0.008	3.5 (1.4, 8.2) *
poor knowledge	14(12.84)	95(87.16)		1
Heath Institution category				
Miesso Woreda Health Centers	11(27.50)	29(72.50)	1	1
GBordede Woreda Health Centers	3(7.14)	39(92.86)	0.022	0.20(0.05, 0.089) *
Asebot Primary Hospital	11(18.64)	48(81.36)	0.31	0.6(0.7, 1.01)
Leadership setting yearly target plan				
Present	15(42.86)	20(57.14)	0.00	7.2(2.82, 18.32) *
Absent	10(9.43)	96(90.57)		1
SEX				
Male	18 (18.75)	78 (81.25)	0.69	1
Female	7 (15.56)	38 (84.44)		0.79 (.307, 2.075)
Education				
Diploma	9 (14.29)	55 (85.71)	0.33	1
Degree	16 (20.78)	61 (79.22)		1.574 (0.64, 3.85)

N.B: Key: * = Statistically significant by COR at p-value ≤ 0.26 1=Reference group

4.6.2. Multivariable Factors Associated with Adherence to Hand Hygiene.

The multi-collinearity test was carried out to see the correlation between/among independent variables in multivariable analysis. High correlations (e.g., above 0.7 or 0.8) from correlation matrix indicated collinearity, hence age and age groups were evicted from the multi-variable analysis. Multivariable logistic regression was used to determine the significance influence of explanatory variable on outcome variable using the p-value with adjusted odds ratio. In multivariable modeling variables that significantly remained as predictors of factors associated with HHS adherence were: Workplace reminders, Behavioral control, Subjective norm, System change (availability and accessibility of HH products-facility), knowledge, setting yearly HH target/plan to be significantly associated with HHA at a $p < 0.05$ (table 8).

Accordingly, this study yielded that the presence of workplace reminders (e.g., posters, alerts) having 3 times more adherence than those without reminders evidenced by (AOR= 3.0, 95% CI= 1.09, 8.01) after adjusting for other variables.

From a qualitative perspective, an experienced female nurse¹ emphasized that visual cues in the workplace serve as vital reminders for healthcare professionals (HCPs) to adhere to HH, provided they are well designed, appropriately placed, well-maintained and updated regularly. She noted that effectively reinforced reminders could help sustain commitment to protocols, especially during busy periods when HHA may fade. However, she emphasized that access to HH guidelines or pamphlets was limited in their unit, but there was 'Showing-off efforts to create banners and reminders during outbreaks.'

Further, quantitative multivariable analysis revealed that HCPs Knowledge on hand hygiene standard was directly associated with adherence, those having good knowledge were 2.9 times more likely to comply with HHS than those having poor knowledge as evidenced by an adjusted OR (AOR=2.9, 95% CI=1.06, 8.11).

Qualitative insights from a male IPC team member² highlighted that "knowledge alone is insufficient; what's crucial is the wisdom and determination to apply it. When asked about training, he noted that only two HCPs received HH/infection prevention (HH/IPC) training from NGOs. He expressed that the training content often incompatible with the real conditions in health facilities. Although he was waiting for training materials to be sent via Telegram, another

trained colleague³ had a digital copy but no printed version. They confirmed that only provided orientation for available staff, which was not supported by documented minutes or guidelines. But they stressed the importance of regular updates on HH/ IPC best practices for ongoing skill development and the necessary resources to implement knowledge effectively.”

Besides, the findings indicated that the establishment of yearly HH target by leadership in participatory was directly associated with improving HHA rate 7.8 times, with an (AOR= 7.8, 95% CI= 2.15, 22.05) that is having clear HH targets indicated 7.8 times significantly higher HHA than those having not.

Qualitative insights from document review revealed that HCFs with structured HH plan cultivated a culture of accountability among HCPs. Interviews with a male director⁴ of health centre highlighted that measurable goals motivated staff to prioritize HH, fostering a sense of collective responsibility for patient safety. This emphasized the need for organizational and leadership commitment to clear expectations. Besides, a male head⁵ of the IPCC noted that participatory goal setting was lacking, resulting in rushed feedback when agreed targets were absent. He suggested that HH planning that is the establishment of yearly HH target by leadership should be integrated into broader organizational strategies and reported to higher authorities. To ensure sustainability, he recommended selecting “HH or infection prevention IPC champion” monthly, if not weekly.

From attitudinal perspective the study revealed that positive attitude towards hand hygiene was 6.4 times more adhered (AOR= 6.4, 95% CI= 1.3, 30) than those HCPs having unfavorable attitudes. However, the findings having some/one small sample cell of six might render slight instability to an outcome and left out to consider as a predictor. *Qualitatively, it was found that HCPs who recognized HH as vital to patient care tended to follow protocols more consistently. In an interview, a male midwife⁶ noted that while adherence to HH improved a bit, lapses occurred when there was no epidemics threat. He emphasized the importance of promoting positive attitudes through reflection, education and awareness campaigns to strengthen belief in the crucial role of HH in enhancing patient outcomes and service quality.*

From the subjective norm perspective, the influence of peers, supervisors and patients on HH adherence behavior was significant, having it made 5.9 times (AOR=5.9, 95% CI=1.06, 33.85) more adherence than those lacking subjective norm.

Qualitative insights from experienced female nurse¹ highlighted the influence of social norms within healthcare teams. She noted, "Peer appreciation and cooperation in HH practices promote adherence." However, she pointed out that some patients inattentive to HH, and HCPs often fail to communicate its importance consistently. She emphasized that leadership modeling of good practices is crucial for shaping collective behavior, though gap in exemplifying this."

As it was found out, behavioral control beliefs (the degree to which a health professional believes that he/she holds access to resources/capacity required to adhere to HH recommendations in various patient-care circumstances) showed that those perceiving difficulty had 0.14 times lower adherence (AOR=0.14, CI95%:0.02, 0.90) compared to those who did not perceive difficulties (AOR=1.14).

An experienced male health officer⁷ highlighted the inadequacies in IPC at HCFs. He noted that this health center lacked essential infrastructure, partly due to design flaws and limited capacity. During the hot season, the stuffy conditions make patient care challenging, especially without air conditioning and water. He also pointed out that population is growing, yet health centers are not expanding to meet this demand. From observation, more than 60% of health centers have sub-standard facilities, lacking sufficient classrooms, documentation spaces, and storage for health products. This overcrowding, with multiple departments sharing single rooms, negatively affected service quality and increases the risk of HAIs. All six-health centers serve populations exceeding their capacity, leading to overcrowding. Document reviews revealed that many health supplies obtained through NGO donations rather than planned purchases, creating reliability issues. Additionally, some purchased products, like alcohol, were criticized for their strong smell, with some HCPs suggesting mixing glycerin to enhance usability. A male lab technician⁷ expressed concern about the accessibility of HH products, emphasizing the need for consistent availability rather than side effects of products/ irritation from use.

As to System Change, that is, availability and accessibility of hand hygiene products and facilities, it was found out that, HCPs who had system change structures being 10.5 times (10.5, 95%CI: 2.2, 49) more adhered than those who didn't have it, keeping other variables adjusted.

Qualitative interviews with a male head nurse⁸ revealed that convenience significantly influences health care providers' adherence to HHS. When essential supplies like soap, water, alcohol-based hand rub (ABHR), and towels readily available at every point of care, along with

functional sinks, adherence to HH standard improves. A male office expert⁹ acknowledged the challenges, noting many HCFs lack continuous water supplies and pressurized water at care points, alongside budget shortages. He mentioned that the office collaborates with NGOs to provide essential resources, including water through rationing. Additionally, eyewitness accounts highlighted serious deficiencies in HCFs. Two out of seven health facilities lack electricity and proper tap water, relying instead on rainwater collection, which was often contaminated by bats excreta. Only five HCFs have intermittent water supply, and none of the toilets equipped with HH setups or sinks availing water buckets within five meters. Senior management discussions underscored that electricity shortages hinder water supply and overall HH adherence but role of electricity neglected by most studies.

Further question from the Interviewer to interviewee: Current practices regarding standard HH adherence vary across HCFs, HCPs and working units. Factors influencing these differences include what asked ? These were synthesized from different interviewees including 1 male HCF director/ 1 male vice head of HCFs and sampled HCPs across seven HCFs themed as follows: *HCPs determination: the more determined HCPs the higher motivated will be to HHA. Then, creating for HH sense of urgency and importance for both HCPs and receivers patients. Leadership Commitment: strong support from leadership correlates with higher HHA.*

Minimize Staff Turnover: high turnover disrupts established practices, leading to lapses in adherence. Workload Pressures: in high-stress environments, immediate tasks may take precedence over HH. For instance a male HCPs¹¹ nurse from the very remote HCF while he was amidst interview, “said wait a minute, patients are coming in line, interrupted the interview. You know that am serving at least two departments, alas, to which position/ department should I belong?” the interview revealed that HCPs often felt overwhelmed by the demands of serving multiple departments in agro pastoral Woredas, leading to a reliance on instinct rather than protocol adherence. One participant stated, “When I’m running to serve between departments, unpaid for duty bonus works for yearlong, desperately dissatisfied and looking for other alternative as well, in this case a reflexive response to be ‘I skip what protocol says because I feel overwhelmed.’” It was noted that this statement of “unpaid for duty bonus works for a yearlong” mentioned in only one Woreda Health centers not represent the other Woreda and Primary Hospital. Synthesized challenges adherence to HHS summarized as: HCFs’ high-stress environment leading to HCPs Role Strain: Work-overload, irregular water supply or water

catchment from roof or water rationings, absence/irregular electricity and relying on donated ABHR. Besides, design flaw the substandard HCFs rooms and none of the toilets of HCFs having HH setups-facilities or sinks within 5 meter. Multiplicity effect: Role confusion resulted from multiplicity of responsibility. HCPs serving multiple department with manifold services in a single overcrowded room *at a time*. Overburdened with this multiplicity HCPs unable to adhere to hand hygiene standard even at critical moments hence confused with his/her role in lower level HCFs/ Health Centres as opposed to higher tier Hospitals. There is very thin line of job departmentalization if any in rural lower level health centres seemed structured as an open task-all departments for all HCPs hence difficult to contrast HH moments across departments. Quoted as saying a 31 year old nurse “When I’m running to serve multiple departments in a single room at a time, moreover *am* unpaid for duty bonus works for yearlong and got overwhelmed the reaction being skipping moments of HHS even at critical times.”

Finally, Interviewer: what additional things do you think would help improve HHA in your HCF facility? *One Health Center vice head replied, “I believe that continuous education and reminders are key. Next is setting participatory goal of HHS. Then, needed more leadership visibility in promoting HH to make a progress. A HH Champion as well. Perhaps incorporating technology, like reminders through our cell phone, could also enhance obedience. “A male IPCC head also added what works in our context is that “making HHA as a single criterion and incorporating into formative performance appraisal system for both HCPs and HCFs will help in making a difference to HHA.” One HCFs supportive staff¹² as issues continue to emerge said do not make dichotomy of supportive staff and clinical staff in HCFs. HCPs who have direct patient contact, have in turn direct contact with supportive staff though record exchange, receipt, documentation, share instrument, environment and have hand shaking to mention a few. Therefore, studies and prevention mechanisms efforts should target personnel in a health system as a whole for IPC to be effective said.* In sum it can be said, HH standard and its practice was influenced by both HCPs perceived perspective as well as from perspective of a real working environments of HCFs as well (table 8).

Table 8: Multivariable factors associated with standard hand hygiene of HCPs in Healthcare Facility of Mieso and GBordede of West Hararghe Zone, Eastern Ethiopia 2024 [n=141]

Explanatory Variables	Adherence to HH Standards		COR (95% CI)	AOR (95% CI)	pvalue
	Yes HH Adherence	No HH Adherence			
Access to WHO HH guideline					
Yes	13(28.3%)	33(31.7%)	2.8(1.13, 6.58) *	1.82(.556, 5.98)	0.32
No	12(12.6)	83(87.4)		1	
Attitudinal perspective category					
Favorable attitude	19(34.6)	36(65.4)	7.1(3.2, 22.1) *	6.41(1.3, 30) *	0.01*
unfavorable attitude	6(6.9)	80 (93.1)	1	1	
Subjective Norm Perspective					
unsupportive social influence	13(13.1)	86(86.8)	1	1	
supportive social influence	12(28.5)	30(71.4)	2.6(1.0, 6.4) *	5.9 (1.06, 33.85)	0.034*

...Continued Table. 8

Explanatory Variables	Adherence to HH Standards		COR (95% CI)	AOR (95% CI)	pvalue
	Yes HH Adherence	No HH Adherence			
Behavioral control perspective					
Yes perceived difficulty	15(14.29)	96(85.71)	2.7(1.0, 6 .2) *	0.14(0.02,0.95) *	0.04*
No perceived difficulty	10(31.03)	20(68.97)	1	1	
Workplace Reminders					
Yes posters/ alerts	15(30.61)	34(69.39)	3.6(1.47,8.84) *	3.0(1.09, 8.11) *	0.02*
No posters	10(10.87)	82(89.13)	1	1	
Safety climate/ environment					
Conductive	9(31)	20(68.9)	2.6(1.03, 6.92) *	1.3(0.33, 4.48)	0.75
not conductive	16(14.3)	96(85.7)	1	1	
Evaluation and Feedback					
Yes feedback	15(21.74)	54(78.26)	1.7(.72, 4.23)	1.28(.49, 3.33)	0.60
No feedback	10(13.89)	62(86.11)	1	1	
System Change category					
Unavailability of facility/ products	10(8.57)	96(91.43)	1	1	
Availability of facility/ product	15(44.44)	20(55.56)	8.5(2.31,4.81) *	10.5(2.2, 49)	0.03*
Knowledge level					

Good knowledge	11(34.38)	21(65.6)	3.5 (1.4, 8.2) *	2.9(1.06, 8.19)	0.044*
Poor knowledge	14(12.84)	95(87.16)	1	1	
Leadership Setting yearly HH target/plan					
Present	15(42.86)	20(57.14)	7.2(2.82,18.32) *	7.8(2.15, 22.05)	0.039*
Absent	10(9.43)	96(90.57)	1	1	
Heath Institution Level					
Health Centers	14(34.64)	67(19.80)	1	1	0.31
Asebot Primary Hospital	11(18.64)	48(81.36)	0.31(0.7, 1.01) *	0.6(0.7, 1.01)	

N.B: *=p-value <0.05, **CI** = Confidence Interval, **COR** = Crude Odds Ratio, **AOR**= Adjusted Odds Ratio **1**=Reference group

5. DISCUSSION

This study investigated adherence to hand hygiene standard and associated factors among healthcare professionals in public healthcare facilities in Agro-pastoral Woredas of West Hararghe Zone.

Subsequently, this study revealed a low HHA rate of just around 18% (95% CI: 12.2%, 24.9%), which aligned or in line with a study at Hiwot Fana Specialized Hospital with HHA of 18.7% (Awoke et al., 2018) and that of Dessie Referral Hospital 17.6% HHA (Tesfaye et al., 2022). But significantly lower than other studies, such as AaBET Hospital in Addis to have the highest 90% HHA (Soboksa et al., 2021), 43.0% at Dubti Referral Hospital (Jemal, 2018), 37.4% in Hararghe Hospitals (Umer, 2021), 39.2% reported in Tanzania (Rayson et al., 2021), in rural Nepal 24.25% HHA (Kumar, 2015) and at MOI Hospital in Kenya 26.3% HHA (MUDI, 2021). Furthermore lower than global average 40% HHA and the Ethiopia pooled HHA at 38 % (Soboksa et al., 2021). Whereas, it is higher than Wachamo University Hospital of 9.2% HHA (Meshesha et al., 2017). The significant discrepancies in HHA across these studies warranted a closer examination of the underlying factors. First, Seasonal and periodic moment related factors might play a critical role in influencing HHA. That is the timing of the study: whether conducted during periods of heightened concern for outbreaks or during calmer times can significantly affect HHA rates. During outbreaks, HCPs may exhibit high awareness and adhere to HH protocols due to increased emphasis on IPC measures. Conversely, in periods without such threats, gratification may set in, leading to lower HHA. Secondly, the methods and tools employed for measuring HHA may differ among studies. Variations in observational techniques, data collection tools, and definitions of HHA can lead to inconsistencies in reported rates. For instance, some studies might utilize rigorous monitoring systems or have stricter criteria for what constitutes HHA. The settings and levels of HCFs involved in studies could further explain the differences in HHA rates. Higher tier HCFs with more resources, better training programs, and stronger institutional support and ongoing reinforcement more likely to foster higher HHA to protocols. In contrast, rural resource-limited settings may struggle to implement effective HH standard. Thirdly, in some regions, cultural norms may influence perceptions of cleanliness and HHS practices, potentially affecting how seriously HCPs adhere to HHS. Additionally, institutional factors such as the availability of resources like soap, water, and hand sanitizers play

a vital role in enabling or hindering HHA. Finally, the level of attention given to HHS by policy-makers and executive bodies can significantly influence HHA rates. Awareness campaigns and policies that prioritize HH can enhance HHA by fostering a culture of safety and accountability within healthcare settings.

Furthermore, this findings showed that HCPs exposed to reminders such as posters and alerts demonstrate a threefold increase in HHA compared to those without such prompts (AOR=3.0, 95% CI=1.09, 8.01). This highlighted how environmental factors significantly influence HCP behaviors. Supporting this, research from Eka Hospital in Addis Sheger revealed a more pronounced effect, with reminders leading to a 3.38-fold increase in HHA (AOR=3.38, 95% CI: 1.18-9.66). In contrast, a Spanish study found a 2.23-fold improvement (AOR: 2.23, 95% CI: 0.44–4.01) (Guerrero-Soler et al., 2024). These discrepancies in effectiveness across various contexts offer valuable insights into the factors that shape the effectiveness of reminders on HH themed as, first the design and location of reminders significantly affect their visibility and effectiveness. Eye-catching posters positioned near sinks or hand sanitizing stations more likely to engage HCPs. The second, Frequency of Exposure: regular encounters with reminders reinforce the importance of HH, helping to establish it as a habitual practice. Environments where reminders consistently visible and updated can facilitate internalization of HH protocols. Thirdly, Cultural Context: cultural attitudes toward HH can shape how reminders received and acted upon. For instance, in Spain, social norms regarding cleanliness may lead to less reliance on external prompts. Lastly, Habit Formation: in cultures where HH is well established and internally in grained, HCPs may need fewer external cues to maintain HHA. Conversely, in settings where practices not deeply rooted, reminders can play a role in embedding them into routine behavior.

This study revealed HCPs with a solid understanding of HH were 2.9 times more likely to follow protocols compared to those with limited knowledge (AOR=2.9, 95% CI=1.06, 8.11). In contrast, a study in Gondar reported an even higher relative increase of 6.8 in HHA among knowledgeable individuals (Engdaw et al., 2019). Similarly, research from Hararghe General and primary hospitals found a 2.25-fold increase in HHA among knowledgeable nurses (Umer et al., 2021), aligning more closely with the current study's findings. Several elements may explain the observed variations in the influence of knowledge on HHA. Training Programs: the effectiveness of training directly affects HCPs' understanding and application of HH protocols. Comprehensive

programs can enhance knowledge retention and translate into improved HHA. If HCPs received less rigorous or infrequent training compared to those in Gondar, this could account for the lower observed HHA rates. Tools and Resources: such as hand sanitizers, protocols, flyers and informative materials, significantly affect both knowledge acquisition and HHA. Limited availability of resources and HH policy can hinder HHA, even among knowledgeable HCPs.

The study's findings highlighted individuals with positive attitudes were 6.4 times more likely to follow HH protocols than those with negative attitude (AOR=6.4, 95% CI=1.3, 30). This contrast becomes even more pronounced when compared to a previous study in Addis, which reported a mere 1.6-fold increase in HHA linked to positive attitudes (AOR=1.61, 95% CI=1.09, 2.38) (Abdo et al., 2020). Several contextual elements may explain the disparity that might be, work environments with strong institutional support for IPC such as accessible HH supplies, and committed leadership likely to render favorable attitudes toward HH. Challenges: in high-pressure environments characterized by heavy patient loads, inadequate staffing might make HCPs frustrated. Others, the backgrounds of HCPs those raised in cleanliness environments may carry these values into their professional lives and can reinforce positive attitudes. However, the finding overlooked because of the smaller size of the sample in attitude categorical cells which might either enlarged or diminished the magnitude and stability of the effect of odds ratio and hence made attitude not to be considered as reliable predictor.

This study further pointed out that HCPs working within a framework of clearly defined HH goals or targets, exhibited HHA rates that were 7.8 times higher (AOR=7.8, 95% CI=2.15, 22.05) than those without such planned targets. This strong correlation underscores the effectiveness of goal setting as a motivational tool to promote best practices in HCFs. Goal Setting in HHA so important for Clarity and Focus: Annual HH targets provide HCPs with explicit expectations reduces ambiguity and confusion and ultimately enhances HHA. Knowing HCPs striving toward specific objectives can significantly boost their motivation to follow HH protocol. Performance Evaluation: yearly targets facilitate implementation of established standards or benchmarking against past performances, enabling HCPs to assess their progress and identify areas for improvement. Despite the compelling evidence supporting the effectiveness of HH target setting, however, there were limitations in the existing literature on this topic. Few studies if any, have examined the impact of goal setting on HHA, making comparisons challenging. This gap

highlighted the need for further exploration in this area. Future research should incorporate goal/target setting as a core variable to had better understand its influence on HHA across various HCFs settings.

Further, study findings emphasized that HCPs experiencing supportive subjective norms were 5.9 times more likely to adhere to HHS than those lacking such support (AOR=5.9, 95% CI=1.06, 33.85). The Kenyan study reported a sevenfold increase in HHA associated with both behavioral factors the norms (MUDI, 2021). The findings underscored the importance of fostering a positive social environment for promoting HHA including these themes The Peer Influence: when peers consistently practiced good HH, it cultivates a culture of HHA that others get inclined to follow. This peer-driven motivation is especially effective in high-stress settings where collective norms shape individual actions. Management Support: when management prioritizes HH, encouraging staff to align their behaviors accordingly. Besides, observing colleagues adhering to HH protocols fosters a sense of obligation and motivates others to imitate these behaviors. Peer Influence: in teams where HH actively discussed and modeled, members more likely to adopt to HH standards. If the participants were part of a collaborative culture that prioritized HH, this could explain the increased HHA. Lastly, Patient Engagement: patients who actively participate in their care by reminding or encouraging HCPs to uphold HHS can positively affect HHA.

As to Behavioral control beliefs those who perceived challenges in accessing resources exhibited lower HHA rates (AOR=0.14, 95% CI=0.02, 0.95). In contrast, HCPs who do not face such barriers show a higher likelihood of HHA (AOR=1.14). This suggested that a sense of control over their environment is crucial for promoting HHA. Compared to Dessie Hospitals: useful control beliefs were linked to a 2.64-fold increase in HHA (AOR=2.64, 95% CI=1.45-4.17) (Gobez, 2014). The Kenyan study reported a sevenfold increase in HHA associated with control beliefs (MUDI, 2021). The discrepancies in findings from this study from others might be themed, Perceived Availability of Products: if HCPs believe that HH products easily accessible, they get more likely to comply with HH standards. This suggested that perceived HCPs enjoying better access to resources, protocol or support might facilitate HHA.

System Change emphasized the importance of accessible HH products and facilities. HCPs with easy access to these resources demonstrated an impressive 10.5-fold increase in HHA rates

(AOR=10.5, 95% CI: 2.2, 49) than those having not, contrasting sharply with findings from other research and illustrating significant variations in HHA across different HCFs settings.

Key Findings and Comparisons: a comparison with Umer et al. (2021) showed that nurses in Hararghe experienced only a 2.19-fold increase in HHA when working in wards with running water, suggested that access to water alone may not suffice without additional supportive resources. Similarly, Guerrero-Soler et al. (2024) found a 6.4-fold increase in HHA when both ABHR and adequate soap/water were available at the point of care. Although significant, this still falls short of the current study's findings, indicating that comprehensive system changes yielded even greater improvements in HH practices. Alene et al. (2022) in Waghimira Zone reported an increased association such as with adequate soap/water 3.7 times; ABHR 2.7 times and sinks 2.3 times, further needing for a more integrated approach to resource availability.

Possible thematic explanations for discrepancies might be interrelated factors such as HCFs infrastructures: variations in infrastructure across regions can greatly influence resource availability and accessibility. HCFs with strong systems for maintaining HH standards typically see higher HHA rates due to consistent supply chains. The second possibility being Resource Allocation: how resources distributed within HCFs systems can create disparities in HHA rates. Besides, institutions that prioritize IPC and adequately fund HH initiatives often achieve better outcomes. Lastly, Survey Design and Measurement: the structure of surveys, including the number of Likert items (a single item versus a construct of multiple items), can affect self-reported rates. A more comprehensive survey capturing a broader range of items may yield better reliable data compared to single-simpler format. This study was unique to measure availability versus accessibility of products-facilities as a 'system change' with all common in purpose related items constructed as a whole rather seeing it in parts item by item, that might diminished the strength of the odds of association of previous studies.

5.1. STRENGTH AND LIMITATION OF THE STUDY

5.1.1. Strength of the Study

This study used facility-based embedded mixed-method study design where, the core quantitative cross-sectional study was supplemented by qualitative study to gain a more holistic understanding of HHS. It used standardized questionnaires that enhanced the credibility and reliability. Further, it involved all HCPs that helped removing or avoiding selection bias. Hence, the study provided a richer context for interpreting Standard Hand Hygiene adherence behaviors.

5.1.2. Limitation of the Study

Limited causal inference: cannot establish a temporal cause effect relationship. Recall bias: HCPs may have difficulty accurately recalling past events of HHS adherence that might have paved a way to potential inconsistencies. Social desirability bias, a response bias that participants may alter their behavioral responses that might have a tendency of either over or under reporting of HHS adherence. Potential for conflicting results: may in some cases arise discrepancies between qualitative and quantitative findings.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusion

The level of adherence to hand hygiene standard among healthcare professionals in public healthcare facilities in Agro-pastoral Woredas of West Hararghe Zone was found to be poor/low. This low adherence to HHS put equally patients and HCPs at significant risk of acquiring infections. For this, very findings revealed nearly only one in five healthcare professionals adhered to HH standard. Further, descriptive quantitative data indicated varying levels of adherence to HH protocols, with notable differences across indicative moments. Besides, factors associated with HHA in multivariable modeling revealed significant determinant predictors of adherence to HHS were found to be: workplace reminders, Behavioral control, Subjective norm, System change (availability and accessibility of HH products), knowledge and leadership setting yearly HH target/plan. Yet, qualitative interviews highlighted common perceptions influencing optimal HH there appeared to be *role-confusion resulted from multiplicity-effect that is serving multiple departments with manifold services in a single overcrowded room. Overburdened with this multiplicity HCPs unable to adhere to HH standard even at critical moments in lower level HCFs/ Health Centres as contrasting to higher tier Hospital. There is very thin line of job departmentalization if any in rural lower level health centres that seemed structured as an “open task/all departments for all HCPs” hence difficult to contrast HH moments across departments. Quoted as saying a 31 year old nurse “When I’m running to serve multiple departments in a single room at a time, moreover am unpaid for duty bonus works for yearlong, got overwhelmed” the reaction being skipping moments of HHS even at critical times.* Overall, the study underscored the need for tailored strategic interventions that address both systemic barriers and individual behaviors to improve adherence to HHS optimally. Therefore, all HCFs should be equipped with adequate knowledge and skills, cultivate good perception on HH, and the leadership with HCPs set yearly target plan and work for it. In addition, make available and accessible HH protocol, HH products and basic hand hygiene facilities to all.

6.2. Recommendation

Based on findings and conclusion the following recommendations were forwarded to the each responsible **entities**:

To West Hararghe Zone Health Office:

It is better equipping HCPs with adequate knowledge and skills, cultivating good perception on HHS, helping HCFs set yearly target plan and enable work for it, making available and accessible HHS protocol, HH products and basic hand hygiene facilities to all.

Leading partnership between hospitals and its cluster health facilities in combating healthcare associated infections.

To Mieso and Gumbi Bordade Woreda Health Offices:

It is better get committed to implementing IPC policy/ plans and protocols in general and HHS strategy in particular playing an intermediary role between Zonal Health office and HCFs: availing products-facilities, awakening on the HHS protocols and awarding on best practices and performance of HH target achieved. Help make supportive mechanism between health centres and health posts in fighting Healthcare associated infections.

To Healthcare Facilities HCFs: Six cluster Health Centers and 1Primary Hospital:

It is better setting participatory achievable target/goal for HHS, commonly working to reach for it, availing posters-workplace reminders, reviving and energizing moral values of HCPs and reporting HHA status as reminders to all concerned body and to practitioners/ HCPs.

To Healthcare professionals HCPs:

Strictly adhere to moments of Hand hygiene at point of care all the time habitually, whether, be it at normal time period or at time of outbreak, HCPs must be determined to value their life and life of patients and fight HAIs ‘through clean hands and minds’.

To Researchers:

Investigating effect of synergies of integrating components of Theory of Planned Behavior along with Health belief model on implementation status of components of Multimodal Hand Hygiene improvement. Conducting Longitudinal Studies: repeated comparative study to assess changes in hand hygiene adherence over time and, between rural agro-pastoral HCFs versus non-agro pastoral HCFs. Undergoing full Qualitative Study to further gain insights into root of HHA problems and the corresponding alternative to the way forward specifically in pastoralist Woredas HCFs.

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8. ANNEXES

8. 1. Information Sheet and Informed Consent for Heads of Health Facility.

1. Introduction:

My name is Ahmed Bedru. I am the Principal Investigator of the study to be conducted in this Mieso and Gumbibordede Healthcare facility. I am studying for my Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and your institution being selected as the study setting.

2. The study/project title:

Adherence to Hand Hygiene Standard Precaution and Associated Factors among HCPs in the selected Agro Pastoral Woredas' of the West Hararghe Zone, Eastern Ethiopia.

3. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the agro pastoral Woredas to plan intervention programs to prevent healthcare associated infections, thereby improve quality of health service by HCPs to patients in general through appropriate HH adherence. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in MPH for the principal investigator.

4. Procedure and duration:

I was collecting data from HCPs using a questionnaire to provide me with pertinent data that is helpful for the study. There are 76 questions to answer. I was interviewing each selected interviewee; it will take about 30 minutes.

5. Risks and benefits:

The risk of participating in this study is minimal, but only taking few minutes from mothers'/care givers' time. There would not be any direct payment for participating in this study. However, the findings from this research may reveal important information for the local health planners.

6. Confidentiality:

The information that we were provided were kept confidential. There were no information that will identify the participants in particular. The findings of the study were general for the study HCPs community and will not reflect anything particular of individual persons. The questionnaire were encoded to exclude showing names. No reference was made in oral or written reports that could link participants to the research.

7. Rights:

Participation for this study is voluntary. The participants have the right to declare to participate or not in this study. If they decide to participate, they have the right to withdraw from the study at any time and this will not label them for any loss of benefits, which they otherwise are entitled. They do not have to answer any question that they do not want to answer. The Health facility has also the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in the Hospital's premises.

8. Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact: **Ahmed Bedru [251920910728, ahmbdru@gmail.com** as well as contact address of the responsible Institutional Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O.Box 235, Harar, Ethiopia].

9. Declaration of informed voluntary consent:

I have read the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that participants have the right to withdraw from the study at any time or not to answer any question that they do not want. I am also informed that the Healthcare facility has the right to stop this study from being conducted if any misdeeds and unethical procedures are observed during the data collection process in its premises. Therefore, I declare my voluntary consent on behalf of (_____) management to allow this study to be conducted in the _____ with my initials (signature).

Name and Signature of Head of the Health facility: _____ Date ____

Name and Signature of the PI: _____ Date _____

This is signed face to face in the presence of the PI.

Please provide a copy of this signed consent to the responsible head.

8.2. Participant Information Sheet and Voluntary Consent Form for Quantitative Study

314. Introduction:

My name is (enter name of the data collector/interviewer here). I am working as a data collector for the study being conducted by (Ahmed Bedru) who is studying for his/her Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

314. The study/project title:

Adherence to Hand Hygiene Standard Precaution and Associated Factors among Healthcare Professionals in the selected Agro Pastoral Woredas' of the West Hararghe Zone, Eastern Ethiopia.

314. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the agro pastoral woredas to plan intervention programs to prevent Healthcare associated infections, thereby improve quality of health service by HCPs to patients in general through appropriate HH adherence. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in MPH for the principal investigator.

4. Procedure and duration:

I was collecting data from HCPs using a questionnaire to provide me with pertinent data that is helpful for the study. There are 76 questions going to answer. I was interviewing, the interview on each the selected interviewee, it will take about 30 minutes.

5. Risks and benefits:

The risk of being participating in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

6. Confidentiality:

The information you will provide us were confidential. There were no information that will identify you in particular. The findings of the study were general for the study community and will reflect anything particular of individual persons or housing. The questionnaire were coded

to exclude showing names. No reference were made in oral or written reports that could link participants to the research.

7. Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

8. Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact: Ahmed Bedru [251920910728, ahmbdru@gmail.com as well as contact address of the responsible Institutional Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O.Box 235, Harar, Ethiopia].

9. Declaration of informed voluntary consent:

I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initials (signature).

Name and signature of participant: _____ Date _____

Name and signature of Data Collector: _____ Date _____

N.B

- This is signed face to face in the presence of the data collector.
- Please provide a copy of this signed consent to the participant.
- If the participant is a lay person and cannot sign initials, can put his/her thumb print in front of a competent witness; and the witness has to sign alongside (with his/her name and address.

8.3. Participant Information Sheet and Informed Consent for Qualitative study

315. Introduction:

My name is (enter name of the data collector/interviewer here). I am working as interviewer for the study being conducted by (Ahmed Bedru) who is studying for his/her Master's degree at Haramaya University, the College of Health and Medical Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant.

315. The study/project title:

Adherence to Hand Hygiene Standard Precaution and Associated Factors among Healthcare Professionals in the selected Agro Pastoral Woredas' of the West Hararghe Zone, Eastern Ethiopia.

315. Purpose/aim of the study:

The findings of this study can be of a paramount importance for the agro pastoral woredas to plan intervention programs to prevent Healthcare associated infections, thereby improve quality of health service by HCPs to patients in general through appropriate HH adherence. Moreover, the aim of this study is to write a thesis as a partial requirement for the fulfillment of a Master's Program in MPH for the principal investigator.

4. Procedure and duration:

I were collecting data from selected heads or experts to provide me with pertinent data that is helpful for the study. There are semi structured questions to answer. I were interviewing, the interview on each selected interviewee, will take about 30 minutes.

5. Risks and benefits:

The risk of being participating in this study is very minimal, but only taking few minutes from your time. There would not be any direct payment for participating in this study. But the findings from this research may reveal important information for the local health planners.

6. Confidentiality:

The information you will provide us were confidential. There were no information that will identify you in particular. The findings of the study were general for the study community and will not reflect anything particular of individual persons or housing. The questionnaire were

coded to exclude showing names. No reference were made in oral or written reports that could link participants to the research.

7. Rights:

Participation for this study is fully voluntary. You have the right to declare to participate or not in this study. If you decide to participate, you have the right to withdraw from the study at any time and this will not label you for any loss of benefits which you otherwise are entitled. You do not have to answer any question that you do not want to answer.

8. Contact address:

If there are any questions or enquires any time about the study or the procedures, please contact: Ahmed bedru [251920910728, ahmbdru@gmail.com as well as contact address of the responsible Institutional Health Research Ethics Review Committee (IHRERC) at office phone 0254662011 or P.O.Box 235, Harar, Ethiopia].

9. Declaration of informed voluntary consent:

I have read/ was read to me the participant information sheet. I have clearly understood the purpose of the research, the procedures, the risks and benefits, issues of confidentiality, the rights of participating and the contact address for any queries. I have been given the opportunity to ask questions for things that may have been unclear. I was informed that I have the right to withdraw from the study at any time or not to answer any question that I do not want. Therefore, I declare my voluntary consent to participate in this study with my initials (signature).

Name and signature of participant: _____ Date _____

Name and signature of Data Collector: _____ Date _____

N.B

- This is signed face to face in the presence of the data collector.
- Please provide a copy of this signed consent to the participant.
- If the participant is a lay person and cannot sign initials, can put his/her thumb print in front of a competent witness; and the witness has to sign alongside (with his/her name and address.

8.4. Data Collection Instruments.

8.4.1. English Version Questionnaire for Quantitative Study

Informed Consent Form for Self-administered Questionnaire

Name of Health Institution _____ Code

Date__ Time started _____

Hello Dears! Good-Morning/Good-Afternoon:

Today I am here to collect data on adherence to hand hygiene standards among HCPs in public healthcare facilities. The primary objective of this study is to assess the level of adherence to hand hygiene standards for infection prevention and associated factors among HCPs in public healthcare facilities in the selected Woredas of West Hararghe Zone, Oromia. Eastern Ethiopia.

Dear participant, please find below a set of questions with respect to standard Hand Hygiene Adherence. Yours polite, genuine and correct answer to items can make this study achieve its intended goals. I would like to assure you that this study is confidential and anonymous. Besides, you have the right to stop the questionnaire interview at any time, or to skip any question that you do not want to answer. The questionnaire is to be filled by yourself. Please do not discuss your responses with anybody. We would highly appreciate your genuine and honest response you are going to provide after reading attentively to each of the questions. It may take less than 35 minutes to respond on an average. If you have questions feel free to ask?

0920910728/ahmbdru@gmail.com

Are you willing to participate in the interview?

☐ Yes, Go to the next page

☐ No, Thank you and go quit the interview

Signature of the consenting interviewee participant _____

Result of the interview: 1. Completed 2. Partially completed 3. The interview refused 4. Others

Data collector's Name: _____ Signature _____

Supervisor's Name _____ Signature _____

Part One

Part-1. Characteristics of Socio-demographic factors. Please circle the code number where appropriate.

No	Questions	Response	Code	Skip
001	Sex	Male	1	
		Female	2	
002	Age (in years)		NA	
003	What is your profession/job title?	Physician (GP, Surgeon, Radiologist)	1	
		Health Officer	2	
		Nurse	3	
		Midwifery	4	
		Laboratory	5	
		Pharmacy	6	
		Others, specify _____	7	
004	Educational Level	Diploma	1	
		Degree	2	
		GP doctor	3	
		Masters and above	4	
005	Department of working/Ward/ Unit	Maternal & child health department	1	
		Inpatient department	2	
		Operation room	3	
		Emergency	4	
		Outpatient OPD	5	
		Laboratory.	6	
		Gyn/Obst	7	
		Other specify	8	
006	Years of work experience	0.5 < year < 1	1	
		1-3 years	2	
		4-6 years	3	
		7-10 years	4	
		> 10+ years	5	
007	Name of this Agro-pastoral Woreda	Mieso	1	
		Gumbi Bordede	2	
008	What is the level of this healthcare facility	Primary Hospital	1	
		Health center	2	

		General hospital	3	
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Part Two

N.B definition: hand hygiene standard **policy** is an official document prepared by ministry of health/WHO as standard precaution or locally adapted guideline for prevention of healthcare acquired infections.

Point of Care is the place where three elements come together: the patient, the healthcare professionals, and the care or treatment involving contact with the patient or his/her surroundings (within the patient zone).

Part-2: Consider your own level of adherence to hand hygiene standard and please indicate how often you wash or disinfect your hands in the following situations. Please, **rate the statements by circling only one option** in the appropriate rectangular box below: **using the scale number 1=Never/No, 2=Seldom/ Rarely, 3= Half of the time /Sometimes, 4= Often/ Mostly, 5= All the time/ Always**

NO	Moments of Hand Hygiene Indications at Point of Care	Level of Adherence				
		1	2	3	4	5
	How often do you perform Hand Hygiene?					
2.1.1	Before patient contact.	1	2	3	4	5
2.1.2	Before clean/aseptic procedures/ surgical procedures and when handling medical equipment.	1	2	3	4	5
2.1.3	After body fluid exposure.	1	2	3	4	5
2.1.4	After contacts with patients.	1	2	3	4	5
2.1.5	After touching patient surroundings.	1	2	3	4	5
2.1.6	After touching potentially contaminated objects or door knobs.	1	2	3	4	5
2.1.7	Before putting on gloves.	1	2	3	4	5
2.1.8	After removing used gloves.	1	2	3	4	5
2.1.9	Before entering patient exam room or isolation room.	1	2	3	4	5
2.2.0	After leaving patient exam room or isolation room.	1	2	3	4	5
2.2.1	After visiting a toilet/ restroom within 5 meters.	1	2	3	4	5

Part 3. Individual and Organizational Factors Influencing Adherence to Hand Hygiene Standard. **Consider** each statement in the light of your own views on hand hygiene standard or behavioral practices that best demonstrates the **extent of your agreement or disagreement** and circle the number in the appropriate box below. **Using the scales: 1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree.**

No	Items of perceived perspectives/attitudes	Scales of responses				
3.1.1	It is hard to regularly do hand hygiene at point of care since patients take priority	1	2	3	4	5
3.1.2	Adherence to hand hygiene whenever recommended would mean loss of valuable time to me.	1	2	3	4	5
3.1.3	There is no written proof as to the usefulness of hand hygiene	1	2	3	4	5
3.1.4	I take pride in doing hand hygiene.	1	2	3	4	5
3.1.5	Doing hand hygiene gives me self-satisfaction.	1	2	3	4	5
3.1.6	Doing hand hygiene has become my personal habit.	1	2	3	4	5
3.1.7	I adhere to moments of hand hygiene more often during epidemics or outbreak than when I supposed it is normal at point of care.	1	2	3	4	5
3.1.8	A co-worker who examines a patient with VRE/germs and then uses my pen without proper hand hygiene is likely to transfer germs to my pen.	1	2	3	4	5
3.1.9	If I do not engage in hand hygiene I may be infected.	1	2	3	4	5
3.2.0	Hand hygiene effectively reduces the incidence of disease from healthcare associated infections.	1	2	3	4	5
3.2.1	If I miss out hand hygiene I may be subject to administrative/disciplinary action	1	2	3	4	5
3.2.2	Washing hands more often cause skin irritation and dryness.	1	2	3	4	5
3.2.3	I do not rub my hands more often because I dislike the smells of an alcohol.	1	2	3	4	5
3.2.4	Hand washing is more preferred to me than alcohol based hand rub in healthcare.	1	2	3	4	5
3.2.5	I do not comply to hand hygiene as I should at point of care because the threat of Covid-19 is over.	1	2	3	4	5
3.2.6	Hand hygiene standard- policy has highly influenced the level of Hand Hygiene adherence in this healthcare facility.	1	2	3	4	5

Part-4: Consider each statement in the light of your own hand hygiene practices and circle the number that best demonstrates the extent of your agreement or disagreement by circling in the appropriate box below using the scales representing: **1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree.**

N0	Subjective Norm/social influence/safety climate	Scales of Responses				
4.1.1	Behavior of my colleagues influence the frequency of my hand hygiene practice.	1	2	3	4	5
4.1.2	Good hand hygiene practice is appreciated by my peers.	1	2	3	4	5
4.1.3	Hand hygiene is a top priority for senior management in my health facility.	1	2	3	4	5
4.1.4	There is a committed team of Infection prevention and control, dedicated to optimal hand hygiene that meet on a regular basis (at least monthly).	1	2	3	4	5
4.1.5	There is health system that encourage recognition of Hand Hygiene Leaders (champions, role-models) are in place.	1	2	3	4	5
4.1.6	Patients are informed about the importance of hand hygiene.	1	2	3	4	5
4.1.7	Patients expect health professionals to practice hand hygiene regularly.	1	2	3	4	5

4.1.8	A hand hygiene institutional target to be achieved is established each year.	1	2	3	4	5
4.1.9	There is communications/information flows that regularly mention hand hygiene e.g. facility letter, documents, clinical meetings.	1	2	3	4	5
4.2.0	I am motivated to adhere to hand hygiene standard sustainably in order to protect myself and my patients.	1	2	3	4	5
N0	Behavioral Control / Institutional factors/system change	Scales of responses				
4.2.1	My healthcare facility has no written infection prevention and control policy	1	2	3	4	5
4.2.2	WHO hand hygiene guideline or similar local adaptations, easily available to all	1	2	3	4	5
4.2.3	I would wash hands more often if there is water supply and soap in the facility.	1	2	3	4	5
4.2.4	I don't wash my hands more often because the sink is inconveniently located	1	2	3	4	5
4.2.5	I wash not my hands more often since there is no functional sink at point of care.	1	2	3	4	5
4.2.6	Products for hand hygiene (soap, alcohol, and paper-towels) are not always available within arm's reach in patient zone in my healthcare facility	1	2	3	4	5
4.2.7	Alcohol-based hand rub dispensers not always available at each point of care	1	2	3	4	5
4.2.8	Single use paper-towels or own sterile towels not available for hand drying	1	2	3	4	5
4.2.9	I do hand hygiene less often due to the high number of patients/ overcrowd	1	2	3	4	5
4.3.0	I don't practice hand hygiene more often since I forget to do it	1	2	3	4	5
4.3.1	I don't wash hands more often since there is no posters/reminders in the facility	1	2	3	4	5
4.3.2	There is regular training for all professional categories (at least annually)	1	2	3	4	5
4.3.3	Not convenient facility design interfere with (barrier to) optimal hand hygiene	1	2	3	4	5
4.3.4	Unavailability of hand hygiene products interfere with optimal hand hygiene	1	2	3	4	5
4.3.5	Inaccessibility of hand hygiene products interfere with optimal hand hygiene	1	2	3	4	5
4.3.6	There is no dedicated/available budget for the continuous procurement of hand hygiene products	1	2	3	4	5
4.3.7	Immediate feedback not given to health-care workers for the hand hygiene compliance supervision/observation sessions.	1	2	3	4	5
4.3.8	Regular (at least annual) ward-based audits are undertaken to assess the availability of hand hygiene resources	1	2	3	4	5
4.3.9	The Primary Hospital is supporting and capacitating its cluster health centers periodically.	1	2	3	4	5

Part-5: It is about knowledge of healthcare professional: Please **circle one** of the answers that you feel is correct after reading the questions. Read the statements and if they go with hand hygiene knowledge, mark a **circle on number 1** for 'yes', **mark a circle on number 2** for 'no', **if unsure circle number 3**

No	Individual factor Hand Hygiene Knowledge	Yes	No	unsure
5.1.1	Are you familiar with the content of the <i>hand hygiene</i> guidelines?	1	2	3
5.1.2	Do you know the 5 key moments for hand hygiene indications?	1	2	3

5.1.3	Do you know the methods/ modes of hand hygiene?	1	2	3	
5.1.4	Do you know the percentage of hospitalized patients due to healthcare associated infection according to recent studies?	1	2	3	
5.1.5	Do you know the level of health professionals hand hygiene adherence in your facility?	1	2	3	
5.1.6	Is Hand washing more important than the subsequent hand drying?	1	2	3	
5.1.7	Washing the hands with soap and water more advised than alcohol based hand rub in health facility	1	2	3	
5.1.8	Hand washing and alcohol-based hand rubs are performed in sequence one after the other	1	2	3	
5.1.9	Hand washing has more procedural steps than alcohol-based hand rubs	1	2	3	
5.2.0	Nail polishes, rings, artificial nails or extenders increases likelihood of colonization of hands with harmful germs.	1	2	3	
5.2.1	Clostridium difficile is readily killed by alcohol-based hand rub.	1	2	3	
5.2.2	Alcohol-based hand rubs have excellent antimicrobial activity against bacterial spores.	1	2	3	
5.2.3	Wearing gloves can substitute hand washing	1	2	3	
5.2.4	Is there the CASH (clean and safe health facility) committee in this healthcare facility?	1	2	3	

5.2.5. Which of the following hand hygiene actions prevents transmission of germs to the patient?

- A). Before touching the patient. B). Immediately after a risk of body fluid exposure
C). After exposure to the immediate surroundings of a patient (i.e., bed, stool, table). D). all

5.2.6. Which of the following hand hygiene actions does not prevent transmission of germs to the healthcare professionals? Circle one best answer:

- A). After touching the patient. B). Immediately after a risk of body fluid exposure.
C). Immediately before a clean/aseptic procedure.
D). After exposure to the immediate surroundings of a patient (i.e., bed, stool, table) E). all

5.2.7. Which of the following pathogens readily survive in the environment of the patient for days to weeks?

- A). E. coli (Escherichia coli) B). Klebsiella spp. C). Methicillin-resistant Staphylococcus aureus
D). Clostridium difficile (the cause of antibiotic-associated diarrhea)
E. Vancomycin-resistant enterococcus (VRE) F). A and D G). C, D &E H). all

5.2.8. Which of the following infections can be potentially transmitted from patients to clinical staff if appropriate glove use and hand hygiene are not performed? Circle the letter of best answer:

- A). Herpes simplex virus infection B). Colonization or infection with methicillin-resistant Staphylococcus aureus C). Respiratory syncytial virus infection D). Hepatitis B virus infection E). all of the above

5.2.9. Which of the following can be achieved by antiseptic hand rubbing? Circle the correct choice:

- A). Removal of all pathogenic microorganisms on hands B). Reduction of transient skin flora on hands
C). Reduction of resident skin flora on hands
D). Elimination of transient skin flora and reduction of resident skin flora on hands E). all

8.4.2. Afaan Oromoo Version Questionnaire Unka Hayyama Bar-Gaaffii /Questionnaire

Maqaa Dhaabbata Fayyaa _____

Lak. Kod

Guyyaa _____ Yeroon jalqabe _____

SEENSA BAR-GAAFFII

Akkam Kabajamaa Hirmaataa! Har'a kaniin as jiruf: dhaabbilee eegumsa fayyaa keessatti ulaagaalee istandardii qulqullina harkaa hordofuu irratti ragaa ogeessota fayyaa irraa walitti qabuuf. Kaayyoon qorannoo kanaa inni jalqabaa sadarkaa eegumsa istaandaardii qulqullina harkaatn infekshinii ittisu fi sababoota dhimmoota kanaan walqabatan dhaabbilee eegumsa fayyaa aanaalee filatamoo Zoonii Harargee Lixaa, Oromiya keessatti argaman qorachuudha. Kabajamaa Hirmaataa, gaaffileen istaandaardii Qulqullina Harkaa hordofuu fi kanneen kanaan walqabatan ilaalchisee armaan gaditti qabxiileen tarraa'eera. Qabxiilee gaaffichaaf deebii sirrii ta'ee yoo kennitan qorannoon kun galma yaadame akka ga'u gargaaruu danda'a. Qorannoon kun maqaa barreessuun kan hin barbaachifne fi iccitiin kan eeggamu, dhimmoota akaadamikii qofaaf kan oolu ta'u isiniif irra deebiin mirkaneessuu barbaada. Qorannichi kun interveenshinii karoorsuu, tarsimoo infeekshinii ittisuufi qulqullina tajaajila fayyaa kennamuu fooyyeessuun fayyaaleessummaa ogeessota fayyaa fi dhukbsattootaaf bu'aa guddaa qaba. Yeroo barbaaddetti gaaffii fi deebii dhaabuuf, ykn gaaffii deebii kennuu hin barbaanne kamiyyuu darbuuf mirga qabda. Gaaffiin ofumaan keetiin guutamuu qaba. Mee deebii keessan nama kamiinuu hin mari'atinaa. Gaaffii tokkoon tokkoon isaaniif deebii dhugaa fi amanamaa erga sirriitti dubbistee booda lakkofsa iskeelii deebii geengeessuun/ itti marsuun kennitaniif dursine baay'ee isin galateefanna. Giddugaleessaan yeroo gara daqiiqaa 30 fudhachuu danda'a. Yoo gaaffii, gaaffannoorratti qabaattan gaafadhaa? 0920910728/ahmbdru@gmail.com irratti bilbilaa. Gaaffii fi deebii kana irratti hirmaachuuf fedhii qabduu?

[] Eeyyee, Gara fuula itti aanutti deemi

[] Lakki, Galatoomaa deemi af-gaaffii dhiisi

Mallattoo hirmaataa bar-gaaffii hayyamaa _____

Bu'aa af-gaaffii: 1. Xumurame 2. Gartokkoon xumurame 3. Af-gaaffiin dide 4. Kanneen biroo

Maqaa walitti qabaa odeeffannoo _____ Mallattoo

Maqaa Suppervaayizaraa _____ Mallattoo

kam jirtu? Kabajamtoota! Ganama/ Waree Booda Gaarii:

Kutaa Tokkoffaa

Kutaa-1ffaa. Amaloota dhimmoota Hawaas-dimoogiraafii.

Kuta-1: Mee bakka barbaachisaa ta'etti **lakkoofsa koodii irratti marsi**

Lak	Gaaffii	Deebii	Koodi	Darbi
001	Saalaa/ Koorniyaa	Dhiira	1	
		Dubartii	2	
002	Umurii (waggaadhaan barreesi)	_____		
003	Ogummaan/maqaan ittiin eebbifamte?	Physician (GP, Surgeon, ...)	1	
		Health Officer	2	
		Nurse	3	
		Midwifery	4	
		Laboratory /Radiology	5	
		Pharmacy	6	
		Others, specify _____	7	
004	Sadarkaa barumsaa	Diploma	1	
		Degree	2	
		Masters and above	3	
		Other Specify	4	
005	Kutaa hojii/ dipartimantii/ ward	Maternal & child health department	1	
		Inpatient department	2	
		Operation room	3	
		Emergency and ICU	4	
		Outpatient OPD	5	
		Laboratory./ Radiology	6	
		Ambulatory	7	
		Other specify	8	
006	Bara muuxannoo hojii	0.5< waggaa >1	1	
		1-3 waggaa	2	
		4-6 waggaa	3	
		7-10 waggaa	4	
		10+ waggaa oli	5	
007	Maqaa Aanaa Horsiisee bulaa kanaa	Mieso	1	
		Gumbi Bordede	2	
008	Sadarkaa dhaabbata Fayyaa kanaa	Primary Hospital/Hospitala jalqabaa	1	
		Health center/Buufata Fayyaa	2	
		General hospital/ HospitalaWaliingala	3	

N.B Hiika: standard policy/imaammanni qulqullina harkaa istaandaardii sanada ofiisaa ministeera fayyaa/WHOn akka of eeggannoo istaandaardii ykn qajeelfama qulqullina haala naannootti madaqfame infekshinii ittisuuf qophaa'eedha.

Point of Care/Sunsuma bakka Kunuunsaa bakka wantootni sadii itti walitti dhufanidha: dhukkubsataa, ogeeyyii eegumsa fayyaa, fi kunuunsaa wal'aansa/the care/ dhukkubsataa ykn naannoo isaa wajjin wal qunnamtii kan of keessaa qabu (zoonii dhukkubsataa keessatti).

Kutaa-Lama

Kutaa-2: Sadarkaa qulqullina harkaa mataa keetiin hordoftu ilaalii fi haalawwan armaan gadii keessatti harka kee yeroo meeqa akka dhiqattu ykn disinfect akka gootu agarsiisi. Maaloo, filannoo lakkoofsaa tokko qofa sanduuqa reektangulaaraa armaan gadii keessatti naannessuudhaan himawwan madaali: **lakkoofsa iskeelii deebi kan bakka bu'u** fayyadamuun: **1=Konkumaa/Hin jiru, 2=Yeroo muraasa/xiqqoo, 3= Yeroo Walakkaa /Yeroo tokko tokko, 4= Yeroo baay'ee/ Irra caalaa, 5= Yeroo hunda**

NO	Yeroowwan Agarsiistuu Qulqullina Harkaa	Sadarkaa Hordoffii Qulqullina Harkaa				
		Lakkoofsa iskeelii deebi				
	Qulqullina Harkaa yeroo meeqa/ hagam raawwattu?					
2.1.1	Tuttuqaa dhukkubsataa dura.	1	2	3	4	5
2.1.2	Adeemsa qulqullina/aseptic dura/ yeroo adeemsa baqaqsanii hodhuu fi yeroo meeshaalee yaalaa qabatan.	1	2	3	4	5
2.1.3	Dhangala'aa qaamaa erga saaxilamte booda.	1	2	3	4	5
2.1.4	Dhukkubsattoota waliin erga wal qunnamte booda	1	2	3	4	5
2.1.5	Naannoo dhukkubsataa tuquun booda.	1	2	3	4	5
2.1.6	Wantoota faalamuu danda'an ykn qaboo balbalaa erga tuqe booda.	1	2	3	4	5
2.1.7	Guwaantii uffachuu dura.	1	2	3	4	5
2.1.8	Guwaantii fayyadamte erga baastee booda.	1	2	3	4	5
2.1.9	Kutaa qorannoo dhukkubsataa osoo hin seenin dura.	1	2	3	4	5
2.2.0	Kutaa qorannoo dhukkubsataa erga baatee booda.	1	2	3	4	5
2.2.1	Meetira 5 keessatti mana fincaanii erga daawwatte booda.	1	2	3	4	5

Kutaa 3. Qabxiilee /faaktarii Istaandardii Qulqullina Harkaa kabajuu irratti dhiibbaa geessisan tokkoon tokkoon hima ilaalcha mataa keetii istaandaardii qulqullina harkaa irratti ykn gochaalee amala isaa **hamma waliigaltee ykn waliigaltee dhabuu kee** akka gaariitti agarsiisu laalcha keessa galchuun **lakkoofsa** sana saanduqa reektangulaaraa barbaachisaa ta'e armaan gadii keessatti **naannessi. Iskeelii fayyadamuun: 1=cimsee walii hin galu, 2=walii hin galu, 3=murtoo hin qabu, 4=waliiigala, 5=cimsee walii gala.**

Lak	Gaffilee Kallatti laalchaa	Iskeelii Sadarkaa deebii				
3.1.1	Dhukkubsattoonni dursa waan kennamuuf yeroo hunda bakka kunuunsaatti qulqullina harkaa gochuun rakkisaadha.	1	2	3	4	5
3.1.2	Yeroo gorfamu hundatti qulqullina harkaa hordofuun anaaf yeroo gatii guddaa qabu dhabuu jechuudha.	1	2	3	4	5
3.1.3	Faayidaa qulqullina harkaa ilaalchisee ragaan barreeffamaa hin jiru.	1	2	3	4	5
3.1.4	Qulqullina harkaa hojjechuudhaan nan boona.	1	2	3	4	5
3.1.5	Qulqullina harkaa hojjechuun ofitti quufinsa naaf kenna.	1	2	3	4	5
3.1.6	Qulqullina harkaa hojjechuun amala dhuunfaa koo ta'eera.	1	2	3	4	5

3.1.7	Qulqullina harkaa yeroo weerara jira jedhee yaade, yeroo idilee caalaa nan hordofa bakka kunuunsaatti.	1	2	3	4	5
3.1.8	Waahilli koo dhukkubsataa jarmii qabu erga qoratee booda qulqullina harkaa sirrii malee qalama koo yoo fayyadame jarmii dabarsuu mala gara qalama kootti.	1	2	3	4	5
3.1.9	Yoon qulqullina harkaa irratti hin bobbaane vaayirasichaan qabamuu danda'a.	1	2	3	4	5
3.2.0	Qulqullinni harkaa dhukkuba infekshinii kunuunsa fayyaa waliin walqabatee dhufu haala bu'a qabeessa ta'een hir'isa.	1	2	3	4	5
3.2.1	Qulqullina harkaa yoo na jalaa darbe tarkaanfii bulchiinsaa/naamusaa hordofsiisa.	1	2	3	4	5
3.2.2	Harka dhiqachuun yoo baay'ate gogaa nama gogsa lolchiisa.	1	2	3	4	5
3.2.3	Urgaa alkoolii waanan hin jaallanneef yeroo baay'ee harka koo hin riguun.	1	2	3	4	5
3.2.4	Eegumsa fayyaa keessatti harka dhiqachuun alkoolii irra caalaa anaaf filatamaadha.	1	2	3	4	5
3.2.5	Weerarri Covid-19 waan xumurameef ykn xumuramuuf waan dhihaateef, kanaaf yeroo ammaa qulqullinni harkaa bakka kunuunsaatti barbaachisaa miti.	1	2	3	4	5
3.2.6	Dhaabbata fayyaa kana keessatti Istaandardiin ykn imaammanni qulqullina harkaa sadarkaa hordoffii qulqullina harkaa ogeessotarratti dhiibbaa guddaa geessiseera.	1	2	3	4	5

Kutaa-4: Tokkoon tokkoon hima gochaalee qulqullina harka keessanii xiyyeeffannoo keessa galchuun lakkoofsa **hamma waliigaltee ykn waliigaltee dhabuu** keessanii akka gaariitti agarsiisu sanduuqa reektangulaaraa barbaachisaa ta'e armaan gadii keessatti **naannessuudhaan** madaallii: **1=cimsee walii hin galu, 2= walii hin galu, 3=murtoo hin qabu, 4=walii gala 5=cimsee walii gala.**

Lak.	Subjective Norm/dhiibbaa hawaasummaa/haala mijataa naannoo	Iskeelii Deebii				
4.1.1	Amala hiriyyoota raawwii irra deddebii harka qulqulleessu irratti dhiibbaa qaba.	1	2	3	4	5
4.1.2	Hojiin /shaakalli qulqullina harkaa gaariin hiriyyoota koo biratti dinqisiifamadha.	1	2	3	4	5
4.1.3	Qulqullinni harkaa hoggansa olaano dhaabbata fayyaa koo biratti dursa kennameeraaf.	1	2	3	4	5
4.1.4	Gareen ittisaa fi to'annoo infekshinii, qulqullina harkaa sirrii ta'ef of kenne kan yeroo yeroon walga'uu (yoo xiqqaate ji'a ji'aan) jira.	1	2	3	4	5
4.1.5	Adeemsi beekkamtii addaduroota Qulqullina Harkaa (shaampiyoonota, fakkeenya ta'an) jajjabeessan hojiirra jira.	1	2	3	4	5
4.1.6	Dhukkubsattoonni waa'ee barbaachisummaa qulqullina harkaa hubachiifamaniiru.	1	2	3	4	5
4.1.7	Dhukkubsattoonni ogeeyyiin fayyaa qulqullina harkaa yeroo yeroon akka shaakalan/hordofan irraa eegu.	1	2	3	4	5
4.1.8	Waggaa waggaan galmi manii qulqullina harkaa bira ga'amuu qabu ni karoofama.	1	2	3	4	5
4.1.9	Dhangala'oonni qunnamtii/odeeffannoo dhaabatichaa yeroo hunda qulqullina harkaa ni kaasan fkn. Xalayaa barrefamoota, walgahii, sanadoota...	1	2	3	4	5
4.2.0	Ofii koo fi dhukkubsattoota koo eeguuf jecha ulaagaa qulqullina harkaa itti fufiinsaan hordofuuf kaka'umsa qaba.	1	2	3	4	5
Lak.	Institutional factors/ amala to'annoo /jijjiiram-infrastructure	Iskeelii deebii				
4.2.1	Dhaabbanni eegumsa fayyaa koo imaammata ittisaa fi to'annoo infekshinii barreeffamaa qaba.	1	2	3	4	5
4.2.2	Qajeelfama qulqullina harkaa WHO'n qophaa'e ykn kan madaqfame salphaatti argama	1	2	3	4	5
4.2.3	Bishaanii fi saamunaa dhaabbaticha keessa waan jiruuf yeroo baay'ee harka nan dhiqadha.	1	2	3	4	5
4.2.4	Sinkiin / sink bakka hin mijanne waan jiruuf harka koo baay'ee hin dhiqadhu.	1	2	3	4	5

4.2.5	Sinkiin hojjatu waan hin jirreef harka koo yeroo baay'ee hin dhiqadhu.	1	2	3	4	5
4.2.6	Oomishaaleen qulqullina harkaa (saamunaa, alkoolii, fi waraqaa) yeroo hunda naannoo dhukkubsataa dhaabbata fayyaa keessatti bakka harkaan qaqqabamutti hin argaman.	1	2	3	4	5
4.2.7	Meshaalee dispeensari harka shukkumu alkoolii irratti hundaa'e yeroo hunda bakka kunuunsaa tokkoon tokkoon isaaniitti hin argaman.	1	2	3	4	5
4.2.8	Waraqaa sooftii harkaan gogsuuf nufayyadu ykn fookaa ofii yeroo hunda ittin goggeeyfatan hin argaman.	1	2	3	4	5
4.2.9	Lakkoofsi dhukkubsattootaa/ garmalee baay'achuu irraa kan ka'e yeroo baay'ee qulqullina harkaa hin hojjedhu.	1	2	3	4	5
4.3.0	Waan dagadhuuf yeroo baay'ee harkaa hin qulqulleefadhu.	1	2	3	4	5
4.3.1	Dhaabbaticha keessatti poostaroonni/yaadachiisa waan hin jirreef harka baay'ee hin dhiqadhu	1	2	3	4	5
4.3.2	Ogeessota hundaaf leenjiin idilee (yoo xiqqaate waggaa waggaan) ni jira.	1	2	3	4	5
4.3.3	Dizaayiniin dhaabbataa mijataa hin taane qulqullina harkaa isa gaarii ta'e gidduu seena	1	2	3	4	5
4.3.4	Meeshaaleen/ oomishaalee qulqullina harkaa argachuu dhabuun qulqullina harkaa isa gaarii ta'e gidduu seena (gufuu)gufachiisodha.	1	2	3	4	5
4.3.5	Meeshaaleen/ oomishaalee qulqullina harkaa dhaqqabamaa ta'uu dhabuun qulqullina harkaa isa gaarii ta'e gidduu seena.	1	2	3	4	5
4.3.6	Bittaa oomishaalee qulqullina harkaa itti fufiinsa qabuuf baajatni adda hin jiru.	1	2	3	4	5
4.3.7	Raawwii daawii qulqullina harkaa hordafuutn booda supparvaayizaroonni hojjetoota eegumsa fayyaatif hatattamaan duub-deebii hinkennan.	1	2	3	4	5
4.3.8	Qabeenyi qulqullina harkaa jiraachuu isaa madaaluuf odiitiin kutaa irratti hundaa'e idilee (yoo xiqqaate waggaa) ni gaggeeffama	1	2	3	4	5
4.3.9	Hospitaalli sadarkaa olaanaa/Hospitaalli buufataalee fayyaa kilaastara isaaf yeroo yeroon deeggaraa jira akkasumas dandeettii cimsuuf.	1	2	3	4	5

Kutaa-5: Innis waa'ee beekumsa ogeessota fayyaa ilaala: Maaloo gaaffilee beekumsa qulqullina harka wajjin deeman erga dubbifatanii booda filannoowwan sirrii ta'uu isinitti dhaga'amu keessaa tokko **geengoo godhaa, lakkoofsi 1 'Eeyyee/ Yes' bakka bu'a, 2 'Lakki/No' bakka bu'a, lakkoofsi 3 'murto hinqabu/ Unsure' bakka bu'a.**

Lak.	Beekumsa Qulqullina Harkaa	Yes	No	Not sure
5.1.1	Qabiyyee qajeelfama qulqullina harkaa ni beektaa?	1	2	3
5.1.2	Yeroowwan ijoo 5n agarsiiftuu qulqullina harkaa ni beektaa?	1	2	3
5.1.3	Mala/ tooftaa (methods) haala qulqullina harkaa ni beektaa?	1	2	3
5.1.4	Akka qorannoowwan dhiyeenya kanaatti, hamma dhukkubsattoota sababa infekshinii eegumsa fayyaa wajjin walqabatee dhufuu reetii (rate) isaa ni beektu?	1	2	3
5.1.5	Hamma ogeeyyii fayyaa qulqullina harkaa dhaabbata fayyaa keessan keessatti hordofan ni beektu?	1	2	3
5.1.6	Harka dhiqachuun harka gogsuu itti aane dhufu caalaa barbaachisaa dha.	1	2	3
5.1.7	Dhaabbata fayyaa keessatti bishaanii fi saamunaadhaan harka dhiqachuun, alkooliin harka riguu caalaa gorfama.	1	2	3
5.1.8	Harka qulqulleesuuf: harka dhiqachuu fi alkoliin harka riguu walduraaduubaan raawwatama.	1	2	3
5.1.9	Harka dhiqachuun, harka riguu alkoolii irratti hundaa'e caalaa steps/adeemsaa baay'ee qaba	1	2	3

5.2.0	Qeensa hamuura /qalama dibuu, hamartii qubaa, qeensa namtolcheen ykn qeensa dheeressuun carraa harka jarmii miidhaa geessisu koloneeffachuu ni dabala.	1	2	3
5.2.1	Clostridium difficile (sababni garaachaa antibaayootikii waliin walqabatee dhufu) alkooliin harka riguun salphaatti ajjeefama.	1	2	3
5.2.2	Alkoolii irratti hundaa’uun harka riguun ispoorota (spores) baakteeriyaa irratti sochii farra maaykiroobiyaanii gaarii qaba.	1	2	3
5.2.3	Guwaantii / glove uffachuun harka dhiqachuu bakka bu’uu danda’a.	1	2	3
5.2.4	Sagantaan CASH (dhaabbata fayyaa qulqulluu fi nageenya qabu) ni beektaa?	1	2	3

5.2.5. Gochi ykn tarkaanfiiwwan qulqullina harkaa armaan gadii keessaa jarmii gara dhukkubsataatti akka hin dabarre kan dhorku isa kami? **Qubee filannoo filatameeratti geengoo godhi:**

A. Dhukkubsataa tuquun dura. **B.** Battala balaa dhangala’aa qaamaa erga saaxilamnee (fkn., dhiiga, fincaan) booda. **C.** Erga naannoo dhiyeenya dhukkubsataa (fkn, siree, sagaraa, minjaala, teessoo fi kkf) saaxilamne booda. **D.** hunda

5.2.6. Tarkaanfiiwwan qulqullina harkaa armaan gadii keessaa jarmii gara ogeeyyii eegumsa fayyaatti akka hin dabarre kan hin dhorkine isa kami?

A. Dhukkubsataa erga tuqeen booda. **B.** Battala balaa dhangala’aa qaamaa saaxilamuu booda **C.** Battala adeemsa qulqulluu/aseptic dura. **D.** Erga naannoo dhiyeenya dhukkubsataa tokkoof saaxilamee booda (i.e., siree, sagaraa, minjaala, teessoo fi kkf) **E.** hunda

5.2.7. Paatojeenoota armaan gadii keessaa kamtu naannoo dhukkubsataa keessatti guyyoota hanga torbanitti salphaatti jiraata? Filannoo armaan gadii Sana **geengoo godhi?** **A.** Ikoolii E. coli (Escherichia coli) **B.** Klebsiella spp. **C.** Istaafiilookaas aureus (MRSA) kan meetisiiliinii dandamatu. **D.** Clostridium difficile (sababni garaachaa antibaayootikii waliin walqabatee dhufu)

E. Vaankomaayisiin kan dandamatu enterococcus (VRE) **F.** A fi D **G.** C, D fi E **H.** Hunda
5.2.8. Fayyadamni guwaantii fi qulqullina harkaa sirrii ta’e yoo hin raawwatamin dhukkubsattoota irraa gara hojjetoota kilinikaatti daddarbuu kan danda’u infekshinii armaan gadii keessaa isa kami? **Qubee deebii geengoo godhi:**

A. Infeekshinii vaayirasii herpes simplex **B.** Koloneeffannaa ykn infekshinii meetisiiliinii dandamatu Staphylococcus aureus **C.** Infeekshinii vaayirasii siinsitii sirna hargansuu **D.** Infeekshinii vaayirasii hepatitis B **E.** kanneen armaan olii hunda

5.2.9. Kanneen armaan gadii keessaa isa kamtu harka farra vaayirasiin riguudhaan/ antiseptic hand rubbing/ galma gahuu danda’a? Filannoo sirrii ta’etti **geengoo godhi:**

A). Maaykiroo-orgaanizimoota dhukkuba fidan hunda harka irratti balleessuu

B). Filooraa gogaa darbaa / transient skin flora/ harka irratti hir’isuu **C).** Filooraa gogaa jiraataa / resident skin flora/ harka irratti hir’isuu **D).** Filooraa gogaa darbaa dhabamsiisuu fi filooraa gogaa jiraataa harka irratti hir’isuu **E).** Hunda

5.3.0. Walumaagalatti sadarkaa hubannoo keessan ulaagaalee ykn qajeelfama qulqullina harkaa hordofuu irratti akkamitti madaaltu? Geengoo godhi:

A) Baayyee gadi aanaa **B)** Gadi aanaa **C)** Giddugaleessa **D)** Ol aanaa **E)** Baayyee ol aanaa

6. Yaada ykn Dhimmota qulqullina harkaa hordofuurratti dhiibbaa eeyyeentaa qaban waraqaa gaafannoo kana fuula duubarratti barreessuun gumaacha taasisaa.

8.4.3. Healthcare Facility Assessment- Document Review Observation Checklist
Healthcare Facility Survey Self-Assessment Checklist: Components of Multimodal HH Strategy

1. System Change				
Question	Answer	Score	WHO improvement tools	
1.1 How easily available is alcohol-based handrub in your health-care facility? Choose one answer	Not available	0	Ward Infrastructure Survey:Method Guide to mplementation II.1	
	Available only in some wards or in discontinuous supply	5		
	Available facility-wide with continuous supply	10		
	Available facility-wide with continuous supply, and at the point of care in the majority of wards	30		
	Available facility-wide with continuous supply at each point of care	50		
1.2 What is the sink:bed ratio? Choose one answer	Less than 1:10	0	Ward Infrastructure Survey. Guide to Implementation II.1	
	At least 1:10 in most wards	5		
	At least 1:10 facility-wide and 1:1 in isolation rooms and in intensive care units	10		
1.3 Is there a continuous supply of clean, running water?	No	0	Ward Infrastructure Survey Guide to Implementation II.1	
	Yes	10		
1.4 Is soap available at each sink?	No	0	Ward Infrastructure Survey Guide to Implementation II.1	
	Yes	10		
1.5 Are single-use towels available at each sink?	No	0	Ward Infrastructure Survey Guide to Implementation II.1	
	Yes	10		
1.6 Is there dedicated/available budget for the continuous procurement of hand hygiene products (e.g. ABHR)?	No	0	Guide to Implementation II.1	
	Yes	10		
Answer this question ONLY if you scored less than 100 for questions 1.1 to 1.6: Is there realistic action plan in place to improve the infrastructure ⁶ in your health-care facility?		No	☐ Alcohol-based Handrub Planning and Costing Tool Guide to Local WHO-recommended Handrub Formulations. Guide	
		Yes		
System Change subtotal		/100		

2.Taining and education			
Question	Answer	Score	WHO improvement tools
2.1. Regarding training of health-care workers in your facility:			
2.1a How frequently do health-care workers receive training regarding hand hygiene ⁷ in your facility? Choose one answer	Never	0	Slides for Education Session for Trainers, Observers and Health Workers Hand
	At least once	5	
	Regular training for medical and nursing staff, or all professional categories (at least annually)	10	

2.3 Is a professional with adequate skills ⁸ to serve as trainer for hand hygiene educational programs active within the health-care facility?	No	0	☐ WHO Guidelines on Hand Hygiene in Health Care ☐ Hand Hygiene Technical Reference Manual ☐ Guide to Implementation II.2
	Yes	15	
2.4 Is a system in place for training and validation of hand hygiene compliance observers?	No	0	☐ Template Letter to Advocate Hand Hygiene to Managers ☐ Template Letter to communicate Hand Hygiene Initiatives to Managers ☐ Template Action Plan ☐ Guide to Implementation II.2 and III.1
	Yes	15	
2.5 Is there is a dedicated budget that allows for hand hygiene training?	No	0	☐ Template Letter to Advocate Hand Hygiene to Managers ☐ Template Letter to communicate Hand Hygiene Initiatives to Managers ☐ Template Action Plan ☐ Guide to Implementation II.2 and III.1
	Yes	10	
Training and Education subtotal		/100	

	Mandatory training for all professional categories at commencement of employment, then ongoing regular training (at least annually)	20	Hygiene Technical Reference Manual Implementation II.2
2.1b Is a process in place to confirm that all health-care workers complete this training?	No	0	Hand Hygiene Why, How and When Brochure
	Yes	20	
2.2. Are the following WHO documents (available at www.who.int/gpsc/5may/tools), or similar local adaptations, easily available to all health-care workers?			☐ Guide to Implementation II.2
2.2a The 'WHO Guidelines on Hand Hygiene in Health-care: A Summary'	No	0	WHO Guidelines on Hand Hygiene in Health Care
	Yes	5	
2.2b The WHO 'Hand Hygiene Technical Reference Manual'	No	0	Hand Hygiene Technical Reference Manual
	Yes	5	
2.2c The WHO 'Hand Hygiene: Why, How and When' Brochure	No	0	Hand Hygiene Why, How and When Brochure
	Yes	5	
2.2d The WHO 'Glove Use Information' Leaflet	No	0	Glove Use Information Leaflet
	Yes	5	

3. Evaluation and Feedback

Question	Answer	Score	WHO improvement tools
3.1. Are regular (at least annual) ward-based audits undertaken to assess the availability of handrub, soap, single use towels and other hand hygiene resources?	No	0	☐ Ward Infrastructure Survey ☐ Guide to Implementation II.3
	Yes	10	
3.2. Is health care worker knowledge of the following topics assessed at least annually (e.g. after education sessions)?			
3.2a. The indications for hand hygiene	No	0	☐ Hand Hygiene Knowledge Questionnaire for Health-Care Workers ☐ Guide to Implementation
	Yes	5	
3.2b. The correct technique for hand hygiene	No	0	
	Yes	5	
3.3 Indirect Monitoring of Hand Hygiene Compliance			
3.3a Is consumption of alcohol-based hand rub monitored regularly	No	0	☐ Soap/Hand rub Consumption

(at least every 3 months)?	Yes	5	Survey □ Guide to Implementation II.3
3.3b Is consumption of soap monitored regularly (at least every 3 months)?	No	0	
	Yes	5	
3.3c Is alcohol based handrub consumption at least 20L per 1000 patient-days?	No (or not measured)	0	
	Yes	5	
3.4 Direct Monitoring of Hand Hygiene Compliance			
Only complete section 3.4 if hand hygiene compliance observers in your facility have been trained and validated and utilize the WHO 'My 5 Moments for Hand Hygiene' (or similar) methodology			
3.4a How frequently is direct observation of hand hygiene compliance performed using the WHO Hand Hygiene Observation tool (or similar technique)? Choose one answer	Never	0	□ WHO Hand Hygiene Observation form □ Hand Hygiene Technical Guide to Implementation II.3
	Irregularly	5	
	Annually	10	
	Every 3 months or	15	
3.4b What is the overall hand hygiene compliance rate according to the WHO Hand Hygiene Observation tool (or similar technique) in your facility? Choose one answer	Unknown to 30%	0	□ Guide to Implementation II.3 □ Observation form □ Data Entry Analysis tools □ Instructions for Data Entry and Analysis □ Epi Info™ software9 □ Data Summary Report Framework
	31 – 40%	5	
	41 – 50%	10	
	51 – 60%	15	
	61 – 70%	20	
	71 – 80%	25	
	□ 81%	30	
3.5 Feedback			
3.5a Immediate feedback	No	0	□ Guide to Implementation Observation and Basic Compliance Calculation forms
Is immediate feedback given to health-care workers at the end of each hand hygiene compliance observation session?	Yes	5	
3.5b Systematic feedback			□ Data Summary Report Framework □ Guide to Implementation II.3
Is regular (at least 6 monthly) feedback of data related to hand hygiene indicators with demonstration of trends over time given to:			
3.5b.i Health-care workers?	No	0	
	Yes	7.5	
3.5b.ii Facility leadership?	No	0	
	Yes	7.5	
Evaluation and Feedback subtotal		/100	

4. Reminders in the Workplace			
Question	Answer	Score	WHO improvement tools
4.1. Are the following posters (or locally produced equivalent with similar content) displayed?			☐ Guide to Implementation II.4
4.1a Poster explaining the indications for hand hygiene Choose one answer	Not displayed	0	☐ Your 5 Moments for Hand Hygiene (Poster)
	Displayed in some wards/treatment areas	15	
	Displayed in most wards/treatment areas	20	
	Displayed in all wards/treatment areas	25	
4.1b Poster explaining the correct use of handrub Choose one answer	Not displayed	0	☐ How to Handrub (Poster)
	Displayed in some wards/treatment areas	5	
	Displayed in most wards/treatment areas	10	
	Displayed in all wards/treatment areas	15	
4.1c Poster explaining correct hand- washing technique	Not displayed	0	☐ How to Handwash (Poster)
	Displayed in some wards/treatment areas	5	
	Displayed in most wards/treatment areas	7.5	
	Displayed at every sink in all wards/treatment areas	10	
4.2 How frequently does a systematic audit of all posters for evidence of damage occur, with replacement as required?	Never	0	☐ Guide to Implementation II.4
	At least annually	10	
	Every 2-3 months	15	
4.3 Is hand hygiene promotion undertaken by displaying and regularly updating posters other than those mentioned above?	No	0	☐ Guide to Implementation II.4
	Yes	10	
4.4 Are hand hygiene information leaflets available on wards?	No	0	☐ Hand Hygiene: When and How Leaflet ☐ Guide to Implement
	Yes	10	
4.5 Are other workplace reminders located throughout the facility?(e.g. hand hygiene campaign screensavers, badges, stickers, etc)	No	0	☐ SAVE LIVES: Clean Your Hands Screensaver ☐ Guide to Implementation II.4
	Yes	15	
Reminders in the Workplace subtotal		/100	

5. Institutional Safety Climate for Hand Hygiene			
Question	Answer	Score	WHO improvement tools
5.1 With regard to a hand hygiene team ¹ that is dedicated to the promotion and implementation of optimal hand hygiene practice in your facility:			☐ Guide to Implementation
5.1a Is such a team established?	No	0	
	Yes	5	
5.1b Does this team meet on a regular basis (at least monthly)?	No	0	
	Yes	5	
5.1c Does this team have dedicated time to conduct active hand hygiene promotion? (e.g. teaching monitoring hand hygiene performance,	No	0	
	Yes	5	

organizing new activities)			
5.2 Have the following members of the facility leadership made a clear commitment to support hand hygiene improvement?(e.g. a written or verbal commitment to hand hygiene promotion received by the majority of health-care workers)			☐ Template Letter to Advocate Hand Hygiene to Managers ☐ Template Letter to communicate Hand Hygiene Initiatives to Managers ☐ Guide to Implementation
5.2a IPC/ CASH officer	No	0	☐ Guide to Implementation
	Yes	10	
5.2b Medical director	No	0	
	Yes	5	
5.2c Director of nursing	No	0	☐ Sustaining Improvement – Additional Activities
	Yes	5	
5.3 Has a clear plan for the promotion of hand hygiene throughout the entire facility for the 5 May (Save Lives Clean Your Hands Annual Initiative) been established ?	No	0	☐ Sustaining Improvement – Additional Activities
	Yes	10	
5.4 Are systems for identification of Hand Hygiene Leaders from all disciplines in place?			
5.4a A system for designation of Hand Hygiene champions ¹¹	No	0	
	Yes	5	
5.4b A system for recognition and utilization of Hand Hygiene role models ¹²	No	0	
	Yes	5	
5.5 Regarding patient involvement in hand hygiene promotion:			☐ Guidance on Engaging Patients and Patient Organizations in Hand Hygiene Initiatives ☐ Guide to Implementation II.5
5.5a Are patients informed about the importance of hand hygiene? (e.g. with a leaflet)	No	0	☐ Guide to Implementation II.5
	Yes	5	
5.5b Has a formalized program of patient engagement been undertaken?	No	0	☐ Guide to Implementation II.5
	Yes	10	
5.6 Are initiatives to support local continuous improvement being applied in your facility, for example:			☐ Sustaining Improvement – Additional Activities for Consideration by Health-Care Facilities ☐ Guide to Implementation II.5
5.6a Hand hygiene learning tools	No	0	☐ Guide to Implementation II.5
	Yes	5	
5.6b A hand hygiene institutional target to be achieved is established each year	No	0	☐ Guide to Implementation II.5
	Yes	5	
5.6c A system for intra-institutional sharing of reliable and tested local innovations	No	0	☐ Guide to Implementation II.5
	Yes	5	
5.6d Communications that regularly mention hand hygiene e.g. facility newsletter, clinical meetings	No	0	☐ Guide to Implementation II.5
	Yes	5	
5.6e System for personal accountability	No	0	☐ Guide to Implementation II.5
	Yes	5	
5.6f A Buddy system for new employees	No	0	☐ Guide to Implementation II.5
	Yes	5	
Institutional Safety Climate subtotal		/100	

8.4.4. Tentative Interview Questions for Qualitative Data

Hi (name of the interviewee), my name is Ahmed Bedru, and I am a graduate student at Haramaya University, majoring in Epidemiology. As a part of my master's MPH, I am studying about reducing HAIs through Hand Hygiene standards. Before I begin, I would like to provide a quick overview of the purpose of this interview and bring your attention to the following interview protocols.

1. Any responses to the interview are voluntary.
2. I would like to record the interview to be able to transcribe the responses. I will delete the audio recording and code the transcription and remove any names, and no one will have access to the recording before deletion.
3. All data will remain completely anonymous. I will assign a random code to each participant, and ensure that any names will not be written or documented on any data. Now, you were given some time to let me review the consent form. Please kindly sign it when you are done reading it and let me know if you may have any questions.

Job Role and Experience

1. May I know what your current role is?
2. May I know how many years of experience do you have at your current role?

Is there any written protocol of IPC or standard precautions so far you know? How do you view it?

A. How can you see the Standard Hand Hygiene Adherence? What are the factors affecting HH compliance?

Prompt1: Individual vs institutional factors vs behavioral factors

Prompt2: Have trained on multi modal Hand Hygiene improvement Strategy and planning for it?

B. Management Approaches on Hand Hygiene Practices

Prompt; 3. What are the current practices or known approaches about hand hygiene in your unit, department and/or organization? How does this differ between units or individuals?

C. Management Perspective on Approaches in the Allocation of Hand Hygiene Resources

2. Can you tell me more about the process when it comes to allocating hand hygiene resources?

Prompt: Are there any other considerations when it comes to planning and allocating to hand hygiene. If any, other experiences to add or any more to say? **Thanks!**

8.5. Curriculum Vitae (CV) of the Principal Investigator (PI)

Curriculum Vitae

1. PERSONAL INFORMATION

Full Name: Ahmed Bedru Ahmed

Sex: Male, **Birth date:** May 6, 1981 G.C

Place of birth: Mieso Woreda, West Hararghe Zone, Oromia, Ethiopia.

Marital Status: Married

Nationality: Ethiopian

Current Address: Mobile: +251920910728 / ahmbdru@gmail.com

2. LANGUAGE SKILLS

No	Languages	Listening	Speaking	Writing	Reading
1	Afan Oromo	Excellent	Excellent	Excellent	Excellent
2	Amharic	Excellent	Excellent	Excellent	Excellent
3	English	Excellent	Very good	Excellent	Excellent

3. Educational Background

Mieso Primary and Junior School from September, 1989- July, 1996 G.C, at Mieso town.

Dire Dawa Comprehensive High School from Sept. 1997- July, 2001, in the city of Dire Dawa.

Jimma University, from Nov 2001-July, 2005 G.C, studied for four years. Graduated with Bachelor's Degree. **At HU** currently studying MPH program in Epidemiology

4. PROFESSIONAL EXPERIENCES

From February 2016 up to present served as an expert of Action Research to improve practice in Mieso Woreda. Currently in charge of Gender, child and youth mainstreamer. Moreover, jointly serving as Mieso Woreda Permanent Peoples' Representative Council Committee **head** of Social Affair Sectors. Monitoring and evaluating eight 8 social sectors among which Health and Education the majors. Assessing performance of these sectors regarding: planning and execution, measuring performance indicators, evaluating, and feed backing their status in written and quarterly review workshop for more than 7 years. Being the leader of a committee of Grant proposal writer and community fundraiser in the Woreda, raised in millions with stakeholders to construct facility like classes and furnished laboratory and ICT rooms. In charge of Mieso Woreda School Water Sanitation and Hygiene coordinator, worked as facilitator with IMC and IR for years. Conducted MEAL for PSNP5 women transfer intervention funded by **World Bank**.

Competencies knowledge skill: As trainer of trainees (ToT)

As trainer of gender and youth sensitive strategy, personal hygiene, supervision, life skill development for capacity improvement. With UNICEF trained on menstrual hygiene mgt for girls clubs, and demonstrated in action how locally re-usable pads and pants produced. Girls clubs wore what they produced after skill development trainings and shared their experience. With Voluntary service organization, (VSO) and Handicap International provided training on psychosocial support, disability and service delivery in emergencies for frontline public workers in disputed conflict prone Kebeles. **Mastering in Leadership (MA)** provided training on change management, leadership, supervision, MEAL, researched result-oriented performance management policy and practice and on continuous professional development (CPD) a few to mention. With NGO, population health and environment (PHE) funded by EU, took several action-oriented trainings, participated in program evaluation, and gained outstanding skills.

From 2005 up to 2016 G.C Served as biochemist, school head and Woreda Office head. Further acted as a coordinator of school Feeding program. Shared best practice of Home-Grown School Feeding program at regional level to scale up to another locality. Supervisor in population census. Active member of Pastoralist Community Development Program case team. Involved in Lowland Livelihood resilience project steering committee member accomplished many hard ware construction and software capacity building projects. In addition, tasked as taskforce of disaster risk management and preparedness program.

5. SPECIAL SKILLS

Computer skills such as MS-Word, PowerPoint, MS-Excel. Having good communication skills. Able to work under any circumstances even in a harsh weather and poor infrastructure in tight period. Project preparation and Program evaluation aspects.

Skilled in SurveyCTO, STATA, SPSS, EPInfo, Data Base Management

Gained Fundamental Data Analysis skill, awarded certificate from Ethio-Coders UAE initiatives

6. REFFERENCES

1. Adam Muhammad: Zonal IMC international Medical corps WaSH program 0985082423
2. Alamayo Yadata; Mieso Woreda Office Head, Mobile: 0972242755
3. Zerihun Ketama Coordinator of Population Health, Environment, and EWNHS at Mieso 0913661554
5. Malkamu Gidisa Mieso Woreda Administration Office head 092045034

