ISSN: 2755-015X

Journal of Surgery & Anesthesia Research

SCIENTIFIC Research and Community

Research Article

Open Access

Hand Hygiene Compliance among Health Professionals at Kilimanjaro Christian Medical Centre- Tanzania, A Hospital based Study

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ABSTRACT

Background: Contaminated hands of Health Professionals have a big role in the transmission of Hospital Acquired infections (HAIs). Identifying existing gap of hand hygiene compliance among health professionals is a key first step in developing a successful Infection Prevention and Control Program (IPC). In 2005, WHO launched the global patient safety challenge: "*clean care is safer care campaign*" and later on in 2009, introduced a cost-effective measure "*my 5 moments for hand hygiene*" to improve hand hygiene compliance among health professionals and decrease HAIs. However, compliance to hand hygiene remains low globally and worse in developing countries.

Study Objective: The study aimed to determine hand hygiene compliance and its associated factors among Health Professionals at a tertiary referral Hospital Kilimanjaro Christian Medical Centre (KCMC).

Materials and Methods: Hospital based, descriptive cross-sectional study with quantitative approach conducted among health professionals at KCMC. Data was collected using self-administered questionnaires to assess hand hygiene compliance to standard WHO guidelines direct observation was done by the researcher using WHO checklist to determine availability of functional hand hygiene facilities. Epi info version was used to enter data, then was exported to SPSS version 21 for analysis. Frequencies distribution, compliance proportion, Chi - square test; Multivariable analysis; OR, AOR, CI were conducted for analysis and presentation of the findings.

Results: All 427 participants consented for the study. Overall compliance of the hand hygiene was 193(45.2%). Almost all participants used running water 417(97.7%) and soap/Alcohol based hand rub for hand hygiene, 292 (68.4%) spent the time recommended for the hand hygiene as per WHO guideline and 426 (99.8%) uses available poster of hand hygiene as a reminder during hand washing while only 193 (45.2%) washed their hands before and after wearing gloves. There is significant association between poor hand hygiene compliance and misconception that wearing gloves removes the needs for hand by OR of 1.24 and AOR 1.7. Availability of 100% of functional hand hygiene facilities/infrastructures was directly observed by a researcher in all working wards/ departments.

Conclusion and Recommendations: Despite effort put globally and National wise (Mikono salama campaign in Tanzania) the compliance of the hand hygiene among the health professionals is still low. A misconception that wearing gloves removes the needs for hand hygiene should be addressed through training and supervision so as to increase the hand hygiene practices. The Ministry of Health (MOH), PO-RALG and Hospital Management Team (HMT) needs to re-enforce Policy, Hospital guidelines and SOPs on hand hygiene. Similar study is recommended to be conducted in the Primary Healthcare (PHC) settings to address the compliance to standard hand hygiene techniques among health care professionals during before and after any medical procedure.

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Received: April 13, 2025; **Accepted:** April 17, 2025; **Published:** April 28, 2025

Keywords: HH Compliance, HH Compliance Factors, Health Professionals, HAIs, IPC, KCMC

Abbreviations

CHMTs: Council Health Management Teams
HAIs: Hospital Acquired Infections
HCWs: Health Care Workers
HH: Hand Hygiene
HMT: Hospital Management Team
IPC: Infection Prevention and Control
KAP: Knowledge, Attitude and Practice
KCMC: Kilimanjaro Christian Medical Centre
MOH: Ministry of Health Tanzania
OPD: Out Patient Department
PO-RALG: President's Office - Regional Administration and Local Government
RHMT: Regional Health Management
SOP: Standard Operating Procedure

SPSS: Statistical Package for Social Science
SRS: Simple random sampling
SSA: Sub Saharan Africa
WHO: World Health organization

Introduction

Hand hygiene is the procedure of washing hands with soap and running water or alcohol-based hand rub based on given set of standard. In hospital setting Hand Hygiene should be performed when arrival at work, time of leaving from work, from patient to another patient contact, after removing gloves, after urination or defecation, before start or after finishing any patient procedure, after exposure to body fluid and after handling contaminated instruments [1].

Globally hand hygiene is considered as an important cost-effective measure towards prevention and control of Hospital acquired infection in healthcare settings. Scientifically it has been proven that when health professional have high compliance of hand hygiene, Hospital acquired infection will be reduced by 50% [1].

The burden Healthcare associated infections worldwide appear to be highly important and significant underreported. A very limited number of studies from Low Middle Income Countries (LMICs) have been conducted assessing Hospital Acquired Infections (HAIs) risk factors. The overall hand hygiene compliance of 31%, ranging 18% - 82% among ward attendants and medical students respectively was reported in a study doe n in Nigeria Onyedibe et al, Based on WHO My 5 moments of hand hygiene, 21% comply before touching patient, 23% before aseptic procedure, 63% after body fluid exposure, 40% after contact with patient surrounding and 41% after patient contact [2,3].

A narrative study was conducted 20 Sub-Saharan countries (peer-reviewed studies, conducted among HCWs, published in the English language between 2005 and 2017) where out of 278 articles identified, 27 articles was analyzed in full length and overall hand hygiene compliance rate among HCWs was estimated to be 21.1%, and concluded that there is a need for more reports of hand hygiene compliance in SSA due to overgrowth of surgical site infections which is the most common form of HAIs [2,3].

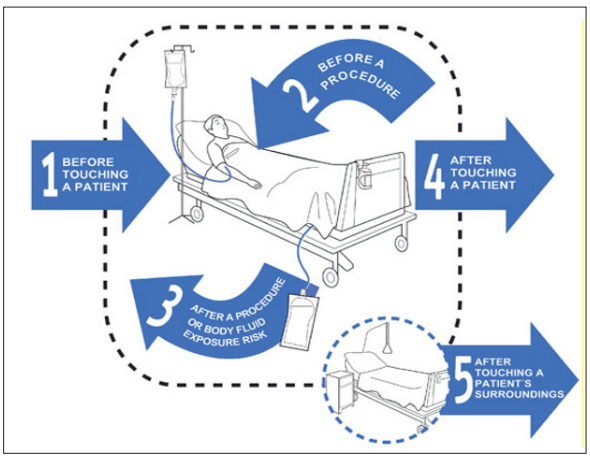

Figure 1: Based on the 'My 5 moments for Hand Hygiene' © WHO 2009

In Tanzania criterion-based audit was conducted during caesarean section to assess the compliance of hand hygiene among Health Care Workers (HCWs) and finding was out of 559 hand hygiene opportunities available, 30.4% was overall compliance and concluded that low hand hygiene compliance observed at the various healthcare facility it was contributed by low understanding regarding standard hand hygiene and lack of hand hygiene materials and infrastructure in most of health facility units [4]. Hence this study aimed at determining compliance of hand hygiene among Health Professionals at a Kilimanjaro Christian Medical Centre (KCMC).

Methodology

Study Design

Institution based, descriptive, cross-sectional study with quantitative approach.

Study Area

The study was conducted at KCMC, which is tertiary university teaching Hospital, located in Northern Tanzania at Kilimanjaro Region serving more than 15million people with 1200 Health Professionals. The Hospital has a bed capacity of 450 serving more than 15 million people from Kilimanjaro, Arusha, Singida, Manyara and Tanga regions of Tanzania and neighbours countries such as Kenya.

Study Population

The target subjects were all health professionals that work in direct contact with the patients.

Inclusion Criteria

Health Professionals working in direct contact with patients who were found in a KCMC compound during a period of study November 2022.

Exclusion Criteria

Health professional who were serious ill during study were excluded.

Sample Size Estimation

Estimation of sample size considered; Finite population that reflects all health professionals in KCMC (N). A 95% level of confidence (Z). A 30.4% hand hygiene Compliance/Prevalence (p) were used [5]. A 5% level of precision (d) were used in the sample size calculation to minimize sampling error and a design effect [for cluster surveys-DEFF] of 1.5.

Sample Size [*n*] *Estimation formula* = [*DEFF*Np* (*1-p*)]/ [(d^2/ $Z^2_{1-\alpha/2}$)*(*N-1*) +*p**(*1-p*)]

$$n = 1.5 \times \frac{1200 \times 30.4(100-30.4)}{((5^2 \div 1.96^2) \times (1200-1)) + (30.4(100-30.4))} \quad n = 384$$

Taking into consideration the possibility of none response, the calculated sample size was assumed as 90% hence; $\frac{384}{0.9} = 426.67$

Therefore, the final working sample size was **427**

Sampling Procedure

A stratified random sampling procedure was used to choose eligible participants. Health Professionals were selected according to size of each stratum (sampling proportionate to size), In that order HCWs were stratified into 4 strata such as; Specialist (Surgeons, Obstetricians, Paediatricians, Physicians and Others), Nurses/ Midwifes (Nurse Officer, Assistant Nurse Officer, Enrolled Nurse, Medical Attendants and others), Clinician (Medical Doctor, Assistant Medical Doctor, Clinical Officer, Assistant Clinical

Officer etc) and Other Cadres (Radiographer, physiotherapist, laboratory scientist and technician). Finally proportional number of participants was selected by simple random sampling technique using lottery method from the list of each stratum.

Table 1: Stratified Random Sampling for Health Professional

Health Professionals	Strata (no of staffs per professional)	sampling proportionate to size (by lottery method)
Specialist	108	38
Nurses/Midwifes	712	252
Clinician	310	111
Other Cadres	70	26
TOTAL	1200 (Health professionals)	427 (Final sample size)

Data Collection Tool and Technique: Distributed questionnaire after being filled by respective health professional was returned back to a researcher within the same day or early next day before starting morning report at specific department. The availability of functional HH facilities (running water, soap, sanitizer, tissue etc.) was assessed by using the checklist.

Data Processing and Analysis: Epi info version was used to enter Data, which then was exported, to SPSS version 21 for analysis. A variable with a p-value <0.05 at 95% confidence level was considered statistically significant.

Table 2: Specific Objective Analysis and Presentation

OBJECTIVE	ANALYSIS AND PRESENTATION
The level of HH compliance among Health Professionals	Frequencies distribution, compliance proportion.
Factors associated with HH compliance among Health Professionals	Chi - square test; Cross tabulation, Multivariable analysis; OR, AOR, CI

Results

Social Demographic Data

In this study all 427 participants consented and were enrolled. Majority of the enrolled participants were male 220 (51.5%) and the age of majority of participants were between 40-50 years 186 (43.6%). Among the participants, 253 (59.3%) were nurses and 105 (24.6%) were clinicians and 40 (9.4%) were specialist.

Compliance to Hand Hygiene among the Health Professionals in KCMC

Overall compliance of the hand hygiene in KCMC is 193(45.2%) as calculated from the criteria for the compliance. Of participant, 425(99.5) reported to comply with regular hand hygiene however during assessments only 193 (45.2%) reported to wash their hands before and after wearing gloves, 417(97.7%) used running water and soap or Alcohol based hand rub for hand hygiene, 292 (68.4%) spent the time recommended for the hand hygiene as per WHO guideline and 426 (68.8%) uses available poster of hand hygiene as a reminder during hand washing procedure, Table 3.

Table 3: Criteria for Hand Hygiene Compliances Score at KCMC

Criteria	Compliance	
	YES n(%)	NO n(%)
Criteria 1: Comply with regular hand hygiene practice according to WHO/CDC recommendations.	420(98.4%)	7(1.6%)
Criteria 2: Comply with WHO my 05 moments for hand hygiene in all 5 situations.	416(97.4%)	11(2.6%)
Criteria 3: hand hygiene technique used frequently	417(97.7%)	10(2.3%)
Criteria 4: Minimal time a person spent during routine hand hygiene procedure in order to kill most of harmful germs in his/her hands.	292(68.4%)	135(31.6%)
Criteria 5: Washing hands before and after wearing gloves	193(45.2%)	234(54.8%)
Criteria 6: Regular use of displayed poster as a reminder during hand washing procedure.	426(99.8%)	1(0.2)
Compliance	193(45.2%)	234(54.8%)

Alcohol hand rub is most used technique for the had hygiene practices in KCMC followed with the running water with soap, 54.1% and 43.6% respectively and 2.3% of them use plain running water without soap, Figure 1.

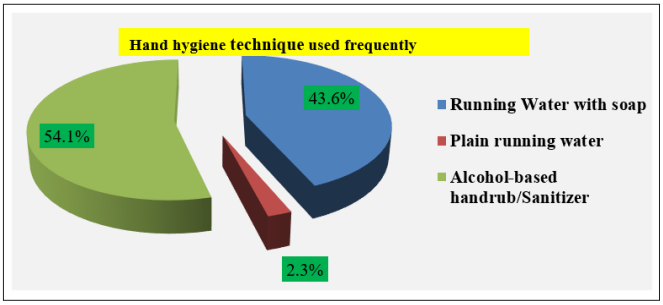

Figure 1: Hand Washing Techniques used Frequently by Health Professionals at KCMC

Among the 5 moments of WHO hand hygiene, this study has found that, about 416 (97.4%) of the participants complied with it. Most of the participants 99.8%, reported that the body fluid exposure as the most situation when they complies with the hand washing practices, also most of health care professionals reported to wash their hand immediately before a clean/ascetic procedure by 99.5% and 1.6% of them were not washing their hands before touching a patient, Figure 2.

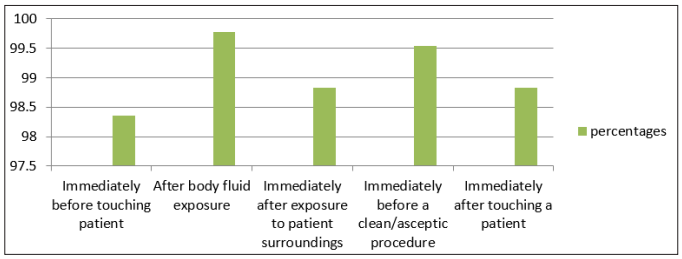

Figure 2: WHO my 05 Moments for Hand Hygiene at KCMC

According to the department, Health care professionals working at urology and Orthopaedic department complied by 84.0% and 90.9%, while HCWs at Surgical, Laboratory, Obstetric, Paediatric, EMD and ENT department reported to comply by 100% with WHO my 5 moments of Hand Hygiene. The distributions are summarized in Figure 3.

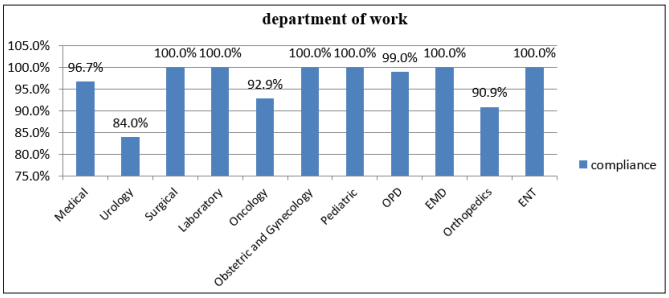

Figure 3: Hand Washing Compliances Distribution According to Departments

According to professional, 100% of other cadres such as Radiographer, physiotherapist, laboratory scientist reported to comply with regular hand hygiene compared to 96.8% of Nurses/ Midwifery. The distributions are summarized in Figure 4.

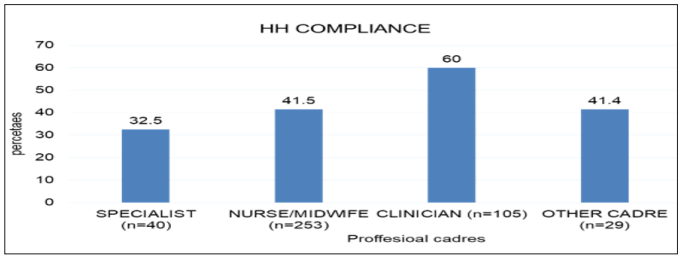

Figure 4: Hand Hygiene Compliances Distribution According to Professionals

Factors Associated with Hand Hygiene Compliance among HCWs at KCMC

The reasons for the poor compliances with hand hygiene practices reported at KCMC include being busy 409(95.8%), Overcrowding of patient and understaffing 398 (93.2%), not being aware of standard hand washing procedure 41 (9.6%).

However, some of the participants have reported that mistrusting that wearing gloves removes the need of hand hygiene reduced their need for the hand washing 116 (27.2%) and Lack of constant water supply and soap/sanitizer as contributory factor for poor hand hygiene practices 20 (4.7), Table 3.

Table 4: Reasons for the Poor Compliances to the Hand Washing Practices

Variable	Frequency	Percent
Often too busy		
No	18	4.2
Yes	409	95.8
Overcrowding of patient/understaffing		
No	29	6.8
Yes	398	93.2
Trusting that wearing gloves removes the need of hand hygiene		
No	311	72.8
Yes	116	27.2
Low awareness level regarding standard hand hygiene procedure		
No	386	90.4
Yes	41	9.6
Long distance from work area to hand washing site		
No	401	93.9
Yes	26	6.1
No sanitizer around ward round troy or at clinic		
No	408	95.6
Yes	19	4.4
Lack of constant water supply and soap/sanitizer		
No	407	95.3
Yes	20	4.7
Hand hygiene poster not displayed at my sink for hand washing procedure		
No	400	93.7
Yes	27	6.3
Lack of hand drying materials		
No	395	92.5
Yes	32	7.5

The independent variables which were significantly associated with the compliance to the hand hygiene were subjected to multiple logistic regressions. Finding was those that did not trust that wearing gloves removes the need of hand hygiene were more likely to comply with 6 criteria for hand hygiene, Table 4.

Table 5: Factors associated with the compliances to the hand hygiene in KCMC

Factors	Compliances		OR	95% C.I.		AOR (a&p)	95% C.I.	
	Poor compliances (n=234)	Good compliances (n=193)		Lower limit	Upper limit		Lower limit	Upper limit
Attitudes status								
Good attitude	207(88.5%)	173(89.6%)	1.13	0.61	2.08	1.57	0.78	3.16
Poor attitude	27(11.5%)	20(10.4%)	Ref					
Knowledge status								
Good knowledge	198(84.6%)	157(81.3%)	1.26	0.76	2.09	1.06	0.60	1.88
Poor knowledge	36(15.4%)	36(18.7%)	Ref					
Duration of work (Years)								
<5	47(20.1%)	36(18.7%)	0.63	0.24	1.67	0.44	0.10	1.84
5-10	75(32.1%)	74(38.3%)	0.81	0.32	2.06	0.64	0.19	2.13
11-15	103(44.0%)	72(37.3%)	0.57	0.23	1.45	0.47	0.15	1.44
>15	9(3.8%)	11(5.7%)	Ref					
Training On hand hygiene								
YES	231(98.7%)	190(98.4%)	-			-	-	-
NO	3(1.3%)	3(1.6%)	-			-	-	-
Trusting that wearing gloves removes the need of hand hygiene								
NO	166(70.9%)	145(75.1%)	1.24	0.80	1.91	1.70	1.04	2.78
YES	68(29.1)	48(24.9%)	Ref					

Availability of 100% of functional Hand hygiene facilities/ infrastructures was observed at KCMC by a researcher after passing through all working wards/departments and assessing the availability and its functionality using checklist.

Discussion

This study aimed to determine the compliance of hand hygiene among Health Professionals at a Kilimanjaro Christian Medical Centre. The response rate was 427(100%) as the recruitment happened at the centre which made availability of the participant optimal.

Compliance of the Health Care Workers on the Hand Hygiene

The Overall compliance on the HH practices according to WHO criteria was found to be 45.2%. The proportion was lower as the misconception on use of gloves removes the needs to hand hygiene had been reported by many of the participants. A previous study done in health care facilities enrolled in a WASH project in Dodoma Region reported a slight higher proportion (51%). The differences is that the latter had a HH training component in the project apart from WASH improvent. The proportion of compliance is low but a bit higher than 30.4% of previously reported in sub-Saharan Africa (Tanzania) [5].

The current study has slightly higher compliance compared to that reported in Jimma University Hospital in Ethiopia which was an observational study and reported a compliance ranging from 34.3% to 42.2% compliances [6,7]. The proportion of compliance is in the current study higher than that reported from primary hospitals in Ethiopia (20%) in 2022 Alene et al. The difference between current study and that reported by Alene and colleagues could be due to hospital setting and level of the hospital whereas the one reported in the current study is a tertiary hospital with diverse specialities that offers on-job training whether formally or informal.

Another possible explanation for the slight higher hand hygiene compliance and hand washing practices in our settings may be explained by effect of COVID-19 pandemic. Most of HCWs were trained and reminded several times through informal and formal training to adhere with regular hand hygiene practice as the most affordable and effective way of eliminating transmission of COVID-19 Viruses. Compared to what was reported by Karmax et al and in other setting in developing countries [8-10].

In this study only 68.4% of the participants reported to use 30-60 seconds during the hand washing procedure which is minimal recommended time by the WHO, this finding is alarming as 32.2% of HCWs are not complying with recommended minimal time for HH by WHO and 54.2% of health care professionals doesn't wash their hand before and after touching a patient hence increases a chance of Nosocomial infection transmission between staff and patients, this finding are concurrent with study done by Allegranzi et al. and Bello et al [11,12].

This study has also been congruent with the WHO guidelines as the majority of the participants reported to use the clean water and soap as well as alcohol hand rub. This practice is supported by the WHO as both techniques are reported to be the most effective in microbial and in preventing the Hospital acquired Infections [10]. However, in this study most of the participants reported to prefer the alcohol-based hand rub than the use of the clean water and soap. This finding is supported by the observations of the availabilities of the required materials in different departments and working areas including the alcohol hand rubs. The use of the alcohol-based hand rubs may also account for the slight higher hand hygiene compliances in this study.

Factors Affecting Compliances to Hand Washing Practices

With regards to the sociodemographic data, this study has found that there is no association between the different sociodemographic characteristics with the hand washing compliances with the exceptional of the age of the health care workers. These findings are in consistent with other studies from the developing countries. Age seem to increase exposure and the experiences of the health care workers for hand hygiene practice in the health facilities [8,13,14].

Despite of having good knowledge and attending formal training with regards to hand hygiene, there is significant association between poor hand hygiene compliance and Misconception that wearing gloves removes the needs for hand hygiene, most of health professional who were not complying with regular hand hygiene reported not to wash their hands before and after wearing gloves, this alarm the needs of assessments of that training if it well addresses this misconception among most of HCWS.

Also, in this study, the posters to remind health care workers on the protocols of hand washing was observed in all the working areas in the Kilimanjaro Christian Medical Centre. On addition, the formal trainings, was crucial for the reminding the health care workers on the hand hygiene in their working areas. This finding is similar to the other studies which have reported that, the hand hygiene compliances were more observed among the trained health care workers than among non-health care workers [13,15].

This study has also reported that there is no significant association between the hand hygiene attitude and the compliance to the hand hygiene practices. These findings may be due to the capacitation of different working areas with the hand hygiene facilities. Also, most of the participants in this study had good knowledge on the hand hygiene in the hospital, as well as the reminding posters as observed in this study. This is contrast to the other studies performed in developing countries like Mali, where by poor infrastructures were reported to be a main factor contributing to inadequate hand washing hygiene among the healthcare workers [13,17].

Conclusions and Recommendations

Conclusion

Despite effort put globally and National wise (Mikono salama compaign in Tanzania) the compliance of the hand hygiene among the health professionals is still poor. Less than a half of participant wash their hands before and after wearing gloves with strong association between poor hand hygiene compliance and misconception that wearing gloves removes the needs for hand hygiene. Also not complying with standard minimal time recommended by WHO in order to kill most of harmful germs in hands, remains a challenge among health care workers [18-39].

Recommendations

The Ministry of Health (MoH), PO-RALG and Hospital Management Team (HMT) needs to re-enforce Policy, Hospital guidelines and SOPs on hand hygiene, also should ensure training to health professionals to remove the misconception that wearing gloves removes the needs of hand hygiene and address the issue of standard minimal time required for effective hand hygiene procedure.

Declarations

Ethical approval and consent to participate.

Ethical Consideration

Ethical approval was obtained from IRB of Muhimbili University of Health and Allied Sciences (Ref. No.DA 282/298/01.C/1362). The permission to conduct data collections was obtained from RAS-Kilimanjaro and KCMC administration office.

Consent from each participant was obtained after explaining and participant understand the purpose of study at Morning meeting of each department and required to sign permission form enclosed with each questionnaire. Filled questionnaire and consent form were handled in highly confidentiality.

Consent to Publication

"Given to journal of surgery & anesthesia research"

Competing Interests

The authors declare that they have no competing interests.

Funding

The study had no external funding. All operational costs were met by authors

Availability of Data and Materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgements

The authors acknowledge District Executive Director (Ms. Anastazia Tutuba and Mr. Jimson Mhagama), Kilimanjaro-RMO Dr Jairy Ndax Khanga and the entire Council Health Management Team (CHMT of Same District); who participated fully in the preparation of this manuscript.

Authors' Contributions

AA: Study concept and design, Drafting of the manuscript, Statistical analysis and interpretation of data.
GS & WJ: Study Supervision and secondary Statistical analysis.

All authors have read and approved the final version of this manuscript, including the authorship.

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