



# **Nursing Students' Perceptions of Barriers to Standard Hand Hygiene Practice Amidst COVID-19 in the Tamale Teaching Hospital of Ghana: A Study conducted on First Degree Rotation Nurses of University for Development Studies**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Hand hygiene is recognized as the leading measure to prevent cross-transmission of COVID-19. The compliance of nurses with handwashing guidelines is vital in preventing COVID-19 disease transmission among patients. Globally, few studies have explored this subject, especially on the nursing students' perceptions and barriers of standard hand hygiene precautionary measures amidst the COVID-19 pandemic.

**Purpose:** The study aimed to assess the perceptions and barriers associated with standard hand hygiene practice during the COVID-19 era among first degree nursing students undertaking their clinical rotation at the Tamale Teaching Hospital of Ghana. This study was conducted in April 2021.

**Materials and methods:** The study employed a descriptive cross-sectional design with a quantitative approach. The study population consisted of first degree student nurses of the University for Development Studies who were on clinical rotation at the Tamale Teaching Hospital in the Northern Region of Ghana. The exclusion criteria were nursing students from other tertiary institutions who were having their vacation practicum at the hospital. A simple random sampling technique was used to select the study participants from the wards of the hospital.

A standard statistical formula was used to arrive at a sample size of 120. Data was collected by using a paper-based self-designed structured questionnaire in English language that has closed-and open-ended questions. Descriptive statistics involving frequencies and percentages were used in representing data.

By using a chi-square test, a p-value <0.05 was considered statistically significant when the association between independent and dependent variables was cross-tabulated. The statistical software that was used for analyzing the data was SPSS version 23.

**Results:** The study had a total of 120 participants with a mean age of 26.48 and a standard deviation of 3.49. On the distribution of perception about hand hygiene, findings indicated that 105 (87.5%) had good perception. Religion and sex respectively were significantly associated with hand hygiene perceptions ( $\chi^2= 13.118$ ,  $p=0.011$ ;  $\chi^2=12.49$ ,  $p=0.014$ ).

**Conclusion:** Though few of the student nurses had a satisfactory perception regarding hand hygiene, it is a cause to worry about since there exist other barriers influencing standard hand hygiene practices at the Tamale Teaching Hospital.

**Recommendation:** There is the need for the quality assurance unit of the hospital to ensure strict compliance to COVID-19 protocols by all categories of health professionals by seeing to it that standard hand hygiene practices are adhered to, irrespective of religious background.

*Keywords: COVID-19; barriers; hand hygiene; perceptions; practice.*

## 1. INTRODUCTION

COVID-19 is a pandemic with a high transmission rate [1]. During a pandemic, one of the cheapest, easiest and most important ways to prevent the spread of a virus is frequent hand hygiene [2,1]. The COVID-19 outbreak which erupted in Wuhan, China, has wreaked devastation on the world system, rampaging all spheres of daily life [3]. As of February 8, 2021 there had been 105,805,951 reported COVID-19 cases with 2,312,278 fatalities worldwide [3]. On March 14, 2020 Ghana recorded her first COVID-19 case. As of December 2020, a total of 54,771 cases have been recorded. Besides, the incidence of infection began to rise at the beginning of the year 2021 [3]. The number of deaths reported as of March 21, 2021 was 725. However, the government of Ghana has recently continued to make efforts to provide medical care

to infected patients and this has contributed to a total of 85,761 recoveries [3]. Moreover, a respiratory infection caused by COVID-19 spread when the virus-containing droplets advance into the body through the eyes, nose or throat. Most often this happens through contact with contaminated hands [4].

Noteworthy, since the identification of the first infected person in the country, the infection and death rates have reached devastating levels. It is worth noting that the supply of antiviral drugs has been insufficient [5]. These have placed huge stress on the healthcare system [6], coupled with struggle with maintaining standard precaution compliance [7]. Thus, prevention is the best way to limit the spread of infection [8,9,5].

Healthcare personnel in Ghana's COVID-19 management centers keenly have complexities in

handling COVID-19 cases. Therefore, this places them in an unceasing contact with the SARS-CoV-2, which can translate into COVID-19 infection, if recommended Infection Prevention and Control (IPC) processes are not conformed to Ashinyo, [3]. Additionally, there is a need to observe the perceptions of availability and the appropriate use of personal protective equipment [6,10]. In view of this appropriate hand hygiene is the utmost effective action to avert hospital-related infections [11]. Therefore, several multicenter trials have found that if healthcare workers fail to maintain hand hygiene in a hospital setting, all strategies developed by top global scientists to reduce hospital acquired infection are easily nullified. Unfortunately, several studies have found that adherence to hand hygiene guidelines is still low and that improvement efforts are frequently ineffective [12].

Hand hygiene, particularly the effective use of alcohol-based hand sanitizers in healthcare institutions and communities, is a crucial component in controlling COVID-19 [13]. Hence, the promotion of hand hygiene behaviour is a complex issue [14]. Reasons for non-compliance with recommendations, thus, occur at individual, group and institutional levels [15]. Individual factors such as social cognitive and psychological determinants provide additional insight into hand hygiene behaviour [16]. Meanwhile, a study conducted in China mentioned that nurses are at risk of infection in the epidemic chain because nurses work with multidisciplinary health teams to help manage patients with COVID-19 condition [2]; therefore, increasing knowledge, behaviour, and attitudes could enhance hand hygiene compliance [11].

Student nurses are often seen to be novice and not capable of effectively complying with standard preventive strategies [17]. A study conducted in Uganda among students of Makerere University and Katanga community residents came out that 8.4% of the participants had good knowledge of hand hygiene [18]. It is, therefore, imperative to assess nursing students' perceptions of barriers to hand hygiene practice amidst COVID-19 because nursing students are the future workforce and their perceptions about hand hygiene barriers would provide an opportunity to address any barriers to hand hygiene practices.

A study by Mutairi et al. [19] mentioned that nine million more nurses and midwives are needed

around the world to achieve universal health coverage by 2030, and therefore the availability of hand hygiene materials is crucial in practicing hand hygiene. Besides, it is important to note that nursing students are in an ideal position to promote effective hand hygiene as they can act as agents of change in practice by sharing good hand hygiene knowledge and practice with qualified staff, which would intend go to help reduce the spread of COVID-19. In view of this nurses would be able to take all possible measures to control the spread of infection to other patients and prevent infection among multidisciplinary health teams [19].

The spread of the disease among medical staff, including nurses, has been associated with overcrowding, lack of isolation room facilities, and environmental pollution in the hospital environment. However, some nurses miss practicing hand hygiene which may make the situation even become more complicated [20]. Notwithstanding, there are inadequate studies concerning these issues among nurses. Besides, no study has focused on the perceptions and barriers of hand hygiene among first degree nursing students in hospitals in the Northern Region of Ghana. Therefore, this study lend itself to address this gap in the literature by assessing the perceptions and barriers to standard hand hygiene practice during this period of COVID-19 among University for Development Studies (UDS) first degree nursing students undertaking their clinical rotations in the Tamale Teaching Hospital of Ghana.

## 2. METHODS AND MATERIALS

This study was carried out in April 2021 at the Tamale Teaching Hospital (TTH) in the Northern Region of Ghana. The hospital serves as a referral hospital for the four northern regions of Ghana. It cooperates with UDS in the northern Ghana to offer undergraduate and graduate programs in medicine, nursing and midwifery, public health and nutrition among other postgraduate programs. It is the third teaching hospital in Ghana after Korle Bu and Komfo Anokye Teaching Hospitals.

The study employed a descriptive cross-sectional study design with a quantitative approach. The study population was first degree nursing students of UDS who were on clinical rotation at TTH. The exclusion criteria, however, were second degree nursing students of UDS and other nursing students from other tertiary

institutions who were having their vacation practicum at TTH. This was done to avoid comparative analyses of respondents' responses.

For the purpose of this study, the standard statistical formula (WikiHow, n.d.) was used to calculate the sample size as detailed below:

### 2.1 Using Standard Formula

$$n = \left( \frac{Z^2 \times P(1-P)}{e^2} \right) \div \left( 1 + \left( \frac{Z^2 \times P(1-P)}{e^2 N} \right) \right),$$

where

n = Sample size

Z = Z-score (95% Confidence level; Z Value  $\Rightarrow$  1.96)

e = Margin of error (i.e., allowing for 0.05)

N = Population size (i.e., 160 nurses)

P = Standard deviation (0.5 or 50%)

Substituting figures into the equation

$$n = \left( \frac{Z^2 \times P(1-P)}{e^2} \right) \div \left( 1 + \left( \frac{Z^2 \times P(1-P)}{e^2 N} \right) \right)$$

$$n = \left( \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2} \right) \div \left( 1 + \left( \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2 \times 160} \right) \right)$$

$$n = \left( \frac{3.8416 \times 0.25}{0.0025} \right) \div \left( 1 + \left( \frac{3.8416 \times 0.25}{0.0025 \times 160} \right) \right)$$

$$n = 384.16 \div 3.401$$

$$n = 112.95501323 \sim 112.96 \approx 113$$

However, for attrition rate where there was an anticipation of non-response by participants leading to missing data and then reducing the number of respondents for the study, it was prudent to increase the sample size. This was calculated as:

$$nA = \frac{n}{C},$$

where

nA = Sample size (based on attrition or non-response)

n = Sample size (i.e., 113)

C = Confidence level (i.e., 0.95 or 95%)

Substituting figures into the equation

$$nA = \frac{n}{C} = \frac{113.0}{0.95} = 118.94736842 \sim 118.95 \approx 119.0$$

Therefore, the final sample size used for the study was 120 when one was intentionally added to the 119 to round-off the figure.

The number of participants for the study was spread according to the proportion of the number of student nurses of UDS at the various wards of the Tamale Teaching Hospital using the lottery system.

Data was collected using a paper-based self-designed structured questionnaire that has closed- and open-ended questions. The questionnaire was administered in the English language. Participants who had more than five items answered right on the hand hygiene perceptions were scored as having good perceptions on the hand hygiene. However, respondents with less than four correct responses were deemed as having satisfactory hand hygiene perceptions.

Data was analyzed using SPSS version 23, and frequency tables were used to present the results. In the analysis, a p-value <0.05 was considered statistically significant when the association between independent and dependent variables was cross-tabulated using the chi-square test.

## 3. RESULTS

### 3.1 Background Characteristics of Study Respondents

A total of 120 student nurses were interviewed in this study after fulfilling the inclusion criteria. The mean age was 26.48 years (SD=3.49) with majority of the student nurses 54 (45%) have their age ranging between 25 and 28 years. Female student nurses being 53.3% (64/120) dominated the respondents for this study. Regardless, 66.7% were single, Muslims (50.0%) being half of the respondents in terms of religion; and those who claimed to be living with both parents (31.7%, n=38) were more than those living with either parent or living with other (Table 1).

### 3.2 Perceptions about Hand Hygiene

Majority of the student nurses 105 (87.5%) had good hand hygiene perception and the rest had satisfactory hand hygiene perception. However, when they were asked if they have heard of hand hygiene, 91.6% (110/120) agreed to the

statement; and those who further agreed to the statement that hand hygiene is simple and serves as an effective way to prevent infection formed 95.8% of the respondents. More so, 98.3% agreed that hand washing under running water with soap (or use of sanitizer) is a good practice to follow.

However, 100 (83.3%) disagreed with the indication that one could only wash hands only when they are soiled or dirty, and 34 (28.3%) again disagreed that with always the availability of running water (in big containers with taps fix to them referred to as Veronica buckets) for hand hygiene practices. When it came to the question of regular hand washing is for only nurses and other healthcare workers, it was interesting to note that five (4.2%) were uncertain in their response in this regard.

Some participants, 41 (34.2%) disagreed with the assertion that female nurses perform hand hygiene frequently than male nurses. When the statement was posed to the students that one would wash hands under running water before and after contact with the patient, 114 (95.0%) disagreed with that statement (Table 2).

### 3.3 Barriers to Hand Hygiene Practices among Nurses

The study found that 87 (72.5%) agreed to the assertion that one of the things that could serve as a barrier and prevent standard hand hygiene practice was high workload and understaffing. Eighty-nine (74.2%) agreed that when one lacks knowledge on guidelines to hand hygiene, it could lead to that person not practicing hand hygiene. However, 36 (30.0%) disagreed with the statement that interference from healthcare workers, in terms of the patient relationship, makes one forget about standard hand hygiene practice. The distribution of the student nurses' responses on barriers to hand hygiene at Tamale Teaching Hospital is shown in Table 3.

### 3.4 Association between Socio-Demographic Characteristics and Hand Hygiene Perceptions

A chi-square test was performed to find out how statistically significant the independent variables impact on the dependent variables. Among the variables analyzed, sex was found to be significantly associated with hand hygiene

**Table 1. Socio-demographic characteristics of participants**

Variables	Frequency (N=120)	Percentage (100%)
Age		
- ≤24	36	30.0
- 25 – 28	54	45.0
- 29 – 32	25	20.8
- 33 – 36	2	1.7
- 37+	3	2.5
Mean ± standard deviation of the ages	26.48±3.49	
Gender		
- Male	56	46.7
- Female	64	53.3
Marital-status		
- Single	80	66.7
- Married	36	30.0
- Divorced	4	3.3
Religion		
- Christian	48	40.0
- Muslim	60	50.0
- Traditional	12	10.0
Who do you live with		
- Father	25	20.8
- Mother	23	19.2
- Both	38	31.7
- Other	34	28.3

Source: Field Survey (2021)

**Table 2. Hand hygiene perceptions**

Variables	Agree (%)	Uncertain (%)	Disagree (%)
1. Have you heard of Hand hygiene	110 (91.6%)	0 (0.0%)	10 (8.3%)
2. Hand hygiene is simple yet an effective way to prevent infections	115 (95.8%)	4 (3.3%)	1 (0.8%)
3. Hand washing under running with soap or use of sanitiser is a good practice.	118 (98.3%)	1 (0.8%)	1 (0.8%)
4. One wash hand only when they are soiled or dirty	14 (11.7%)	6 (5.0%)	100 (83.3%)
5. Running water (veronica bucket) is always available for hand hygiene	86 (71.7%)	0 (0.00%)	34 (28.3%)
6. Regular hand washing is for only Nurses and other healthcare workers	6 (5.0%)	5 (4.2%)	109 (90.8)
7. Female nurses perform hand hygiene frequently than Male nurses.	73 (60.8%)	6 (5.00%)	41 (34.2%)
8. One will wash hand under running water before and after contact with the patient	4 (3.3%)	2 (1.7%)	114 (95.0%)
<b>Distribution of Perception about Hand Hygiene</b>			
<b>Variable</b>	<b>N=120</b>	<b>100%</b>	
Good Perception	105	87.5%	
Satisfactory Perceptions	15	12.5%	

Source: Field Survey (2021)

perceptions ( $\chi^2= 12.49$ ,  $p=0.014$ ). Besides, religion was statistically significant with hand hygiene perceptions showing a strong association when the chi-square test was performed on the variables ( $\chi^2=13.118$ ,  $p=0.011$ ). All other variables were not significantly associated as shown in Table 4.

#### 4. DISCUSSION

Nurses being the first-line healthcare providers of hospitalized patients play an essential role in the treatment and prevention of the ascending trend of COVID-19 (Paterson et al., 2020). This study assessed first degree nursing students' perceptions of barriers to standard hand hygiene practice amidst COVID-19 in the Tamale Teaching Hospital of Ghana.

Despite the fact that there is progress in the deepening understanding of the disease, there exist an unusual fear and misinformation partly due to an increase in daily caseload. These have placed enormous strain on the healthcare system [21]. This has necessitated the need to struggle with maintaining standard precaution compliance, juggling between caring for diverse people while trying to remember to observe the moments of handwashing [7]. Furthermore, despite the facilities lapses in ensuring the availability of IPC strategies, there is a need to observe the perceptions of the appropriate use of

personal protective equipment (PPE) [6,10]. Despite these challenges, a relentless gold standard of upfront hand hygiene serves as the bedrock for a nuanced and agile response to the current COVID-19 threats. This study revealed that 34 (28.3%) had the awareness that they did not have an adequate supply of running water (from the Veronica bucket) for hand hygiene practices. This finding was parallel to a study in the Middle East that showed 156 (36%) participants had an adequate perception of the availability of materials for their hand hygiene practices [19].

These current findings among the first degree nursing students having their rotational practice at Tamale Teaching Hospital confirmed other related studies that mentioned that there is the need for nurses to be taught good hand hygiene practices to improve their perceptions and attitudes towards hand washing [11].

Concerning barriers to hand hygiene, this study found out that 87 (72.5%) of the participants acknowledged high workload and understaffing as major barriers. About 89 (74.2%) mentioned that lack of knowledge correlates with lack of hand hygiene practice. However, 36 (30.0%) believed that prolong stay with patients does not make one forget about hand hygiene practice. Yet 71 (59.2%) mentioned that hand hygiene supplies are inaccessible, hence difficult to

**Table 3. Responses on barriers to hand hygiene**

<b>Variable</b>	<b>Agree (%)</b>	<b>Disagree (%)</b>	<b>Uncertain (%)</b>	<b>Total (%)</b>	<b>Mean</b>	<b>Standard deviation</b>
1. Skin irritations caused by hand hygiene agents prevent one from hand hygiene practice.	84 (70.0%)	21 (17.5%)	15 (12.5%)	120 (100%)	1.4250	0.70607
2. High workload and understaffing prevent one from hand hygiene practice.	87 (72.5%)	25 (20.8%)	8 (6.7%)	120 (100%)	1.3417	0.60106
3. Lack of knowledge on guidelines for hand hygiene does prevent the practice of hand hygiene.	89 (74.2%)	22 (18.3%)	9 (7.5%)	120 (100%)	1.3333	0.61266
4. Hand hygiene supplies are inaccessible, hence difficult to practice hand hygiene.	71 (59.2%)	37 (30.8%)	12 (10.0%)	120 (100%)	1.5083	0.67358
5. Interference with healthcare workers - patient relationship, makes one forget about hand hygiene.	77 (64.2%)	36 (30.0%)	7 (5.8%)	120 (100%)	1.4167	0.60228

Source: Field Survey (2021)

**Table 4. Association between socio-demographics characteristic and hand hygiene perceptions**

Socio-demographic	Total (N=120)	Hand Hygiene		Statistical Test
		Satisfactory (N=15)	Good (105)	
<b>Age</b>				$\chi^2=1.22$ , $p=0.407$
- ≤24	36	10 (27.8%)	26 (72.2%)	
- 25 – 28	54	5 (9.3%)	49 (90.7%)	
- 29 – 32	25	0 (0.0%)	25 (100.0%)	
- 33 – 36	2	0 (0.0%)	2 (100.0%)	
- 37+	3	0 (0.0%)	3 (100.0%)	
<b>Sex</b>				$\chi^2=12.49$ , $p=0.014^*$
- Male	56	5 (8.9%)	51 (91.1%)	
- Female	64	10 (15.6%)	54 (84.4%)	
<b>Marital status</b>				$\chi^2=4.71$ , $p=0.095$
- Single	80	7 (8.8%)	73 (91.3%)	
- Married	36	8 (22.2%)	28 (77.8%)	
- Divorced	4	0 (0.0%)	4 (100.0%)	
<b>Religion</b>				$\chi^2=13.118$ , $p=0.011^*$
- Christian	48	7 (14.6%)	41 (85.4%)	
- Muslim	60	7 (11.7%)	53 (88.3%)	
- Traditional	12	1 (8.3%)	11 (91.7%)	

Source: Field Survey (2021)

\*  $\chi^2$ ; p-value statistically significant at 5%

practice hand hygiene. These findings were in line with other studies that indicated that the commonest barriers to hand hygiene were lack of soaps, antiseptics, detergents, alcohol sanitizers, lack of running water, and negligence [18]. Other findings that were no different from this assertion were studies that opined that hand hygiene supplies were inadequate and hence acted as barriers to standard hand hygiene practice [8,18]. The study revealed that an atmosphere that nurtures and encourages the use of effective infection-control measures would help reduce the spread of COVID-19.

The results of this study are not different from the observations described elsewhere. For instance, a study opined that availability of hand hygiene equipment, reduced workload, and adequate staff, were helpful interventions that made the staff remember to practice hand hygiene at the appropriate time [3]. The findings of this study may contribute to help put structures in place so that the perceived barriers of standard hand hygiene practices would be mitigated and help to prevent the spread of COVID-19 among health care workers and their patients.

Among the variables analyzed base on the associations between participants' demographic data and their perceptions, sex was found to be significantly associated with hand hygiene perceptions ( $\chi^2= 12.49$ ,  $p=0.014$ ). Besides,

religion was statistically significant with hand hygiene perceptions showing a strong association when the chi-square test was performed on the variables ( $\chi^2=13.118$ ,  $p=0.011$ ). All other variables were not significantly associated.

This study's participant's perception of insufficient hand hygiene practices paints a troubling picture with the potential to increase the risk and spread of COVID-19 among health workers and their clients. In other related studies, hand washing, the use of alcohol-based hand sanitizers, and the use of hand gloves were among the most frequently reported hand hygiene beliefs or perceptions held by other health staff to help prevent COVID-19 [13].

To reduce the risk of COVID-19 transmission at TTH and other hospitals in the country, it is critical to ensure an adequate supply of IPC logistics, such as hand hygiene equipment. There is also the need for behaviour change interventions to reduce the barriers to hand hygiene practice and improve the staff's understanding of the disease conditions so that they will have a positive perception of the disease condition [3]. The identification of first degree nursing students' perceptions of barriers to standard hand hygiene practice amidst COVID-19 would help support nurses by informing leaders and decision-makers about

these issues and to provide recommendations and implications.

## 5. CONCLUSION

This study assessed first degree nursing students' perceptions of barriers to standard hand hygiene practice amidst COVID-19 in the Tamale Teaching Hospital of Ghana. Though few of the student nurses had satisfactory perception regarding hand hygiene, it is a cause to worry about since there exist other barriers influencing standard hand hygiene practices at the Tamale Teaching Hospital.

## 6. RECOMMENDATIONS

1. There is the need for the quality assurance unit of the hospital to ensure strict compliance to COVID-19 protocols by all categories of health professionals by seeing to it that standard hand hygiene practices are adhered to, irrespective of religious background.
2. There should be constant supply of water, alcohol-based sanitizers, and supply of Veronica buckets at the wards and other vantage points at the hospital at all times.
3. Future research should be conducted to assess the nurses' perception regarding barriers to hand hygiene using observational measurements.

## 7. LIMITATION

Our study presents useful information about the problems on Hand hygiene; however, it does not replace practices at the hospital or direct observation.

## CONSENT

Written consent was obtained from the participants. The consent form included information about the study's objectives, nature, and procedures. Participant confidentiality and anonymity were ensured as no names or other personal identifiers were used. All participants were informed that they were under no obligation to participate against their will and that they could stop answering the questionnaire at any time without consequence.

## ETHICAL APPROVAL

The study was carried out following the Institutional Research Ethics Committee and the

Helsinki Declaration. The department of research and development, Tamale Teaching Hospital (Ref: TTH/R&D/SD/03813/04/2021) granted formal approval.

## DATA AVAILABILITY

The authors confirm that all data underlying the findings described in their manuscript are fully available without restriction from the corresponding author based on reasonable request.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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