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Challenges and factors affecting online teaching during covid-19 in nursing and midwifery colleges in northern Ghana: a mixed methods study

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Evidence in Context

- Student nurses and midwives in northern Ghana found online learning less effective than face-to-face education.
- Some lacked smartphones or computers to access online lectures.
- Challenges included high internet costs, unreliable connectivity, power outages, and distractions.
- Stakeholders should revise nursing curricula to combine in-person and online learning for better accessibility and effectiveness.

To view Article

Abstract

Background: The sudden temporal shift to virtual instruction amid the COVID-19 pandemic lockdown affected the educational system worldwide. The purpose of this study is to share the tutors' and students' experiences with online instruction during the COVID-19 pandemic in Northern Ghana.

Methods: A mixed-method cross-sectional survey explored students' and tutors' experiences with virtual instruction and learning. We utilized a purposive sampling method, and a sample size of 468 students and 6 tutors was involved in this study. Bivariate, multivariate, and narrative analyses were used to determine the perspectives of students and tutors regarding online teaching throughout the COVID-19 pandemic lockdown.

Results: Our study revealed that 75% of the students perceived virtual teaching as less efficient than direct face-to-face teaching. Students studying public health nursing (OR 0.35; CI 0.14, 0.89, p=0.027) and midwifery (OR 0.56, 95%CI 0.31, 1.00; p = 0.05) were less likely to perceive online teaching as ineffective than those studying general nursing. Students who supported the integration of online teaching into traditional face-to-face teaching were less likely to perceive the online lectures as being ineffective than those who did not support blended teaching (OR 0.47; C I0.28, 0.81; p = 0.006). Both tutors and students had challenges with the cost of internet data, reliable internet connectivity, power outages and interruptions from family and friends.

Conclusions: To enable online instruction and learning, institutions must ensure that all students have access to computers, tablets, and smartphones as well as dependable, affordable internet.

Keywords: *COVID-19, e-learning; nursing; midwifery; students; online-teaching*

Introduction

The COVID-19 pandemic has profoundly affected education across the globe [1]. In response to the pandemic, governments in various countries implemented border closures, travel restrictions, quarantines, and physical distancing to reduce the transmission of the infection [2]. Following the COVID-19 outbreak, governments ordered educational institutions to stop face-to-face lessons because Higher

Population densities, such as those found in educational institutions, have a significant role in the rapid transmissiont of COVID-19 because they make it more difficult to maintain social distance [3]. Schools were required to switch to online and virtual education almost overnight [4]. As of the middle of April 2020, school closures in response to the pandemic had impacted approximately 1.723 billion students globally [5]. According to UNESCO, approximately 98.4 % of the world's student population was affected involving 191 countries worldwide [6]. Students' academic work and lives have been significantly impacted by the COVID-19 infection [7]. Examples of such effects include moving to online lectures and tutorials, doing away with libraries, altering the lines of communication between teachers and administrators, implementing new evaluation techniques, and having different workloads and performance expectations [1].

In Ghana, following the rapidly rising COVID-19 cases, the President of the Republic was compelled to implement pragmatic strategies to help reduce viral transmission. Border closures, travel limits, quarantines, physical distancing, and shutdown of all institutions, including Health Training Institutions were instituted to reduce the spread of the infection. In response to the President's directive to assist curb the spread of COVID-19 in Ghana, all educational institutions were closed [8]. universities offer online courses or programmes before the COVID-19 outbreak in Ghana [9], most Health Training Institutions used the direct instruction approach. Learning from the global interventions in the educational sector and drawing inspiration from educational institutions that used online instruction, educational institutions in Ghana supported the pandemic-related online learning program [9,10]. But most educators and students were just beginning to use online learning, especially in nursing and midwifery schools with woefully inadequate technological infrastructure [11]. Given the limited technological advancements, some difficulties were anticipated to accompany online learning, including high internet data costs, a limited ability to teach, evaluate, and assess students solely online and disruptions at home while learning [12].

Students who do not have access to computers and internet service at home or take courses that cannot be taught online may find it difficult to change from face-to-face to virtual classes [13]. Given that many Ghanaian students were utilising online education for the first time, it is crucial to assess their perceptions to recommend more effective options and shape policy going forward. Some research that evaluated students' perspectives and experiences with online learning under COVID-19 was predominantly carried out in high-income nations [14-16]. Most Ghanaian studies on the experiences of students using online learning has been done with students from different academic fields [17-18] and higher institutions [9].

We recognize a study conducted among nursing and midwifery students in northern Ghana [19]; however, it was limited to focusing solely on students. A study to investigate how nursing and midwifery students and instructors felt about online instruction during the COVID-19 outbreak will be unique in the Ghanaian setting. The emphasis on nursing and midwifery students—who frequently take part in more practical knowledge acquisition—makes the current study distinctive and significant. This study explores the experiences of students and tutors with online teaching and learning during the COVID-19 break in Northern Ghana.

Study Design

Study participants included Health Tutors and students at the Health Training Institution in Northern Ghana. The study was a mixed-methods and the quantitative component was a cross-sectional study. The use of the mixed method in this study allows us to view the experience of online teaching and learning from varied perspectives to help us comprehend the situation more thoroughly [20]. The use of this research technique involves the use of multiple methods to increase the validity and reliability of findings.

Study population and setting

Northern Region is one of Ghana’s sixteen regions with 14 districts and Tamale is its capital city. Thetarget populationfor this study was nursing and midwifery students at the four Nursing and Midwifery Training Colleges in the Northern Region with a total of about 2000 students. The study was conducted on final/third-year students, as they were in their second semester when the pandemic struck because they had experienced both face-to-face and online instruction and learning while COVID-19 was in effect. This made them the appropriate group for this study. Similarly, health tutors who experienced both direct and virtual/online teaching were interviewed.

Sample and Sampling Procedure

The complete enumeration method was used in this study. The complete enumeration method is a kind of purposive sampling technique in which the researcher examines the entire population with a specific set of characteristics or who pass through the same situation under investigation [21]. Therefore, data were collected from all students who were admitted into the institutions before the COVID-19 pandemic school closure and were currently in school at the time of the data collection. The sample size of the study was determined by the summation of final-year students of each institution under the study. The total population sampling of the selected health training institutions was 468.

Data Collection Techniques and Instrument

Closed-ended, self-administered questionnaires were created to gather sufficient relevant information from students about the impact of COVID-19 on their academic lives and factors related with the effectiveness of online teaching and learning. Following expert consultation and an extensive literature review, a well-structured questionnaire was developed for data collection. The questionnaire was then pretested on 20 students of Nursing and Midwifery Training College, Kpembe to identify ambiguous and poorly constructed questions. The pre-test allowed for a reframing of questions, which originally did not convey the actual meaning of the question. There were three sections in the questionnaire. Section "A" had sixteen (16) questions on the socio-demographic and academic characteristics of students, such as gender, age, course of study, and level of study. Section "B" consisted of nine (9) questions which featured statements to assessthe impact of COVID-19 on students' educational and academic lives using three options on a scale of (1) to (3) [Yes=1, No=2, Not sure=3. Section "C" assessed the difficulties and efficacy of remote instruction and learning amid the COVID-19 lockout, where students had to choose between two possibilities. (Yes=1 and 2=No). Trained research assistants explained to the students who provided consent how to complete the questionnaire (hard copy). The authors supervised the data collection and checked all administered questionnaires for completeness. The qualitative arm of the study involved nursing and midwifery tutors of the training colleges involved in this study. Face-to-face interviews were conducted in English language and recorded with the tutors' consent. Health tutors were asked whether they received training before the commencement of virtual teaching during the COVID-19 lockdown, the type of online platform they used and the challenges they faced throughout the online teaching process.

Data Analysis

The data was initially entered into an Excel spreadsheet and later transferred into SPSS version 24. Descriptive statistics and bivariate and multivariate logistic regression were used to determine predictors of online teaching and learning effectiveness. All statistical tests were considered significant at a $p< 0.05$. The qualitative data were transcribed verbatim and analyzed using narrative analysis. The three main coding stages—open, axial, and selective—were used to examine the qualitative data [22]. As we read the scripts, the themes first appeared at random, and we then had to select how to include them in the data template. The pertinent themes were then carefully examined, contrasted, and reorganised into related groups. Lastly, we established links between the main data points, the study questions, and ideas surrounding tutors' experiences with online instruction during the COVID-19 pandemic lockdown.

Results

The socio-demographic characteristics of Participants

The socio-demographic characteristics of the students are presented in Table 1. Of the 468 students included in the study, the majority (n=433/468, 92.5%), were between the ages of 21 to 29 years and most of them were females (n=347/468, 74.1%). Nearly half of the students (n=225/468, 48%) were general nursing students, and two-thirds (n=312/468, 66%) lived in urban areas. Most of them (n=411/468, 87.7) reported that they lived with their parents during the lockdown. About 46.4% of their fathers and 35.9% of their mothers had high school or higher education. Most (n=127/468, 36.8%) of the students' fathers were formal sector workers while for their mothers, the majority (n=263/468, 56.2%) said they were crafts or traders.

The perceived effect of the COVID-19 lockdown on the academic life of nursing and midwifery students.

The perceived influence of COVID-19 on nursing and midwifery students' academic lives is displayed in Supplementary Table 1S. The majority (n=291/468, 62.2%) of the students were concerned about how the academic year would end during the COVID-19 lockdown. This concern was significantly more common among females than males (83.3% vs 69.4%) and among students who were residents in the urban area than in the rural areas (n=209, 71.8% vs 51.7%). About half (51.1%) of the students were concerned that their end-of-semester examination may be postponed. Students in the urban areas were significantly more concerned about the possible postponement of examinations than students in the rural areas (n=172, 72.0%).

Table 1: Sociodemographic characteristics of participants

Variable	Frequency	Percentage (%)
Age		
≤20 years	27	5.8
21 to 29 years	441	94.2
Gender		
Male	121	25.9
Female	347	74.1
Program of study		
General Nursing	225	48.1
Midwifery	179	38.2
Mental Health Nursing	35	7.5
Public Health Nursing	29	6.2
Place of residence		
Urban	312	66.7
Rural	156	33.3
Living with parents during lockdown		
Yes	411	87.8
No	57	12.2
Educational level of the father		
No education	116	24.8
Primary or Junior High School	135	28.8
Senior High School or Higher	217	46.4
Educational level of the mother		
No education	166	35.5
Primary or Junior High School	168	35.9
Senior High School or Higher	134	28.6
Father’s occupation		
Formal sector workers	172	36.8
Craft and Traders	108	23.1
Farmer	149	31.8
Not working	39	8.3
Mother’s occupation		
Formal sector workers	108	23.1
Craft and Traders	263	56.2
Farmer	66	14.1
Not working	31	6.6
Did you get a daily COVID-19 update?		
Yes	370	79.1
No	98	20.9

However, this concern did not differ between males and females (70.7% vs 77.1%). More than half (56%) of the students perceived that during the period of the COVID-19 lockdown, studies were

More stressful than usual. This perception did not differ between male and female (76.3% vs 71.2%) students as well as those in rural and urban areas (67.9% vs 63.6%).

Table 2: The challenges nursing and midwifery students experience with online teaching and learning during the COVID-19 lockdown

Variable	Total	Gender N (%)		Residence N (%)	
	N (%)	Male	Female	Urban	Rural
Did you have a personal computer, tablet, or smartphone to support your online learning?					
Yes	401 (85.7)	113 (93.4)	292 (84.1)	270(86.5)	135(86.5)
No	67(14.3)	8 (6.6)	55 (15.9)	42 (13.5)	21 (13.5)
Was the cost of internet data an issue/challenge during the period of online teaching and learning?					
Yes	428 (91.5)	112 (92.6)	316 (91.1)	285(91.3)	143(91.7)
No	40 (8.5)	9 (7.4)	31 (8.9)	27 (8.7)	13(8.3)
Did you have reliable internet connectivity to attend online lectures?					
Yes	116 (24.8)	35 (28.9)	81 (23.3)	80 (25.6)	36(23.1)
No	352 (75.2)	86 (78.1)	266 (76.7)	232(74.4)	120(76.9)
Was a power outage a problem for you during the online teaching and learning?					
Yes	284 (60.7)	71 (58.7)	213 (61.4)	184(59.0)	100(64.1)
No	184 (39.3)	50 (41.3)	138 (38.6)	128(41.0)	56 (35.9)
Did you have a quiet or conducive place for online lectures?					
Yes	241 (51.5)	56 (46.3)	185 (53.3)	163 52.2)	78 (50.0)
No	227 (48.5)	65 (53.7)	162 (46.7)	149(47.8)	78 (50.0)
Were there disruptions from family members and friends during online lectures?					
Yes	308 (65.8)	85 (70.2)	223 (64.3)	208(66.7)	100(64.1)
No	160 (34.2)	36 (29.8)	124 (35.7)	104(33.3)	56 (35.9)
Do you think you have sufficient computer skills for online work?					
Yes	264 (56.4)	77(63.6)	187 (53.9)	190(60.9)*	74 (47.4)
No	204 (43.6)	44 (36.4)	160 (46.1)	122(39.1)	82 (52.6)
What is your source of internet connectivity?					
WIFI	35 (7.5)	6 (5.0)	29 (8.4)	26 (8.3)	9 (5.8)
mobile data	431 (92.5)	115 (95.0)	316 (91.6)	286(91.7)	145(94.2)

Table 2 presents the challenges students experienced with virtual teaching and learning through the COVID-19 lockdown. Sixty-seven (67/468, 14.3%) students did not have a personal computer, tablet or smartphone to support online learning and nearly all (91%) of the students had challenges with the cost of internet data. Regarding reliable internet connectivity, 75% (352/468) of students reported not having reliable internet connectivity and for 29.8% (105/352) of them, poor connectivity was frequent. Most of the students indicated that power outages (power cuts) (60.7%) and interruptions from family and friends (65.8%) disrupted online teaching and learning for them. Furthermore, 48.5% (227/468) of them reported a lack of a serene environment at home for virtual education. Nearly all of the student's source of internet connectivity was mobile data (n=431, 92.5%). The majority of the students (n=264/468, 56.4%) had sufficient computer skills for online studies.

Table 3 presents the efficiency of virtual instruction and learning during the COVID-19 lockdown. Out of the 468 students, the majority (248/468, 52.6%) of them stated that the Zoom platform was more effective or simple to use. Compared to face-to-face teaching, 81.6% (n=382/468) of the students did not understand the concepts taught online and 80.6% (n=377/468) were less focused or attentive during the online teaching. Most of the students (n= 330, 70.5%) did not feel comfortable asking questions during lectures in the online learning environment. Two-thirds (n= 321, 68.8%) of the students said they were not able to discuss with other students or work in groups during online teaching and learning. Almost all the students (n=385/468, 82.3%) indicated that they skipped online lessons more often than they did with face-to-face lessons before the pandemic. Three-quarters (n=351/468, 75%) of the students said online instruction was less helpful than face-to-face and only One quarter (n=121/468, 25.9%) of the students agreed that online instruction should continue or be integrated into nursing and midwifery education post-pandemic.

Factors associated with nursing and midwifery students' perception of the efficiency of virtual instruction and learning throughout the COVID-19 lockdown.

Table 4 presents factors associated with nursing and midwifery students' perception that online instruction and learning were ineffective throughout the COVID-19 lockdown. After controlling for other significant covariates, students studying public health nursing (OR 0.35; CI 0.14, 0.89, p=0.027) midwifery students (OR 0.56, 95%CI 0.31, 1.00; p = 0.05) were less likely than those studying general nursing to perceive the online teaching as ineffective. Students who supported the integration of online teaching into traditional face-to-face teaching were less likely to perceive the online lectures as being ineffective compared to those who did not support blended teaching (OR 0.47; C I0.28, 0.81; p = 0.006)., Students who perceived the outcome of the online lectures and examinations during the lockdown period to be better than the previous face-to-face lectures and examinations were less likely to perceive the online lectures as being ineffective (OR 0.42; CI 0.25, 0.70; p = 0.001)

Tutors' perspectives on e-learning.

Training on online teaching

As stakeholders in the teaching and learning process, some tutors were also interviewed regarding their experiences with online teaching (Table 2S & 3S). Some tutors did not receive any training to use the online platform before the implementation of the e-learning. They used their previous knowledge or learnt how to conduct teaching in one or two online platforms before they could teach students. Below is a statement captured by one tutor.

"I did not receive any training before I started teaching, learnt it by myself, and there was no formal training on online tuition of students" (tutor 4).

A management member indicated that they did not organize any training for their tutors before the implementation of the online teaching process.

"No, I was the academic coordinator, but I didn't organize any training for my tutors neither did I participate in any special training for that exercise, and nevertheless we managed to carry through during that Covid-19 era" (tutor 2).

Type of online teaching and learning platform used.

In terms of the type of virtual instruction and learning platform used by tutors to teach students, tutors use more than one online platform to teach students. Tutors used either the Zoom application or WhatsApp for the teaching of students. Some also used the combination of Zoom applications and WhatsApp to teach students online.

"I used 2 applications, I used Zoom more, and I also combined WhatsApp and Zoom. I started with Zoom and then at a point in time most of the students were comfortable with the WhatsApp medium, so I will take recordings and put them on the page to give them time to go through the audio and then come back with questions" (tutor 1).

Class participation.

Compared to traditional face-to-face, tutors reported declining classroom interaction during online teaching. They did not have full control of the class and students were not active participants in the classroom. Unlike face-to-face, a tutor could call a student and ask a question and the student will not reply. Some tutors had to repeat some of the topics because they thought students did not grasp the concepts and or had low class attendance during online teaching.

Table 3: Effectiveness of online teaching and learning during the COVID-19 lockdown

Variables	N (%)	Gender N (%)		Residence N (%)	
Which online platform was more effective or simple to use?		Male	Female	Urban	Rural
Zoom	248(52.6)	62(25.2	184(74.8)	164(66.7)	82(33.3)
Google Meet	159(34.0)	44(27.7)	115(72.3)	113(71.1)	46(28.9)
Others	63(13.4)	15(23.8)	48(76.2)	35(55.6)	28(44.4)
Were you able to work in groups or interact with other students using online teaching and learning?					
Yes	147(31.4)	41(27.9)	106(72.1)	101(68.7)	46(31.3)
No	321(68.8)	80(24.9)	241(75.1)	211(65.7)	110(34.3)
Did you feel comfortable composing questions during the online teaching and learning environment?					
Yes	138(29.5)	39(28.3)	99(71.7)	101(73.2)	37(26.8)
No	330(70.5)	82(24.8)	248(75.2)	211(63.9)	119(36.1)
Would you say you were able to manage your study time effectively during the online teaching than you would have face-to-face?					
Yes	103(22.0)	31(30.1	72(69.9)	70(68.0)	33(32.0)
No	385(78.0)	90(24.7)	275(75.3)	242(66.3)	123(33.7)
Would you say you were able to complete assignments on time with the online teaching than you had in face-to-face?					
Yes	113(24.1)	35(31.0)	78 (69.0)	74(65.5)	39(34.5)
No	355(75.9)	86(24.2)	269(75.8)	238(67.0)	117(33.0)
Would you say you understood the concepts taught online better than you would have in face-to-face?					
Yes	86(18.4)	24(27.9)	62(72.1)	54(62.8)	32(37.2)
No	382(81.6)	97(25.4	285(74.6)	258(67.5)	124(32.5)
Would you say you were more focused or attentive during the online teaching than you did face-to-face?					
Yes	91(19.4)	21(23.1)	70(76.9)	63(69.2)	28(30.8)
No	377(80.6)	100(26.5)	277(73.5)	249(66.0)	128(34.0)
Was the outcome of the online teaching and examinations better than the previous face-to-face teaching and examination outcomes?					
Yes	147(31.4)	39(26.5)	108(73.5)	90(61.2)	57(38.8)
No	321(68.8)	82(25.5)	239(74.5)	222(69.2)	99(30.8)
Would you suggest that online teaching be continued or integrated into the traditional face-to-face classroom teaching of your institution?					
Yes	121(25.9)	32(26.4)	89(73.6)	83(68.6)	38(31.4)
No	347(74.1)	89(25.6)	258(74.4)	229(66.0)	118(34.0)
Overall, how will you rate the effectiveness of online teaching and learning during the lockdown?					
Not effective	351(75.0)	91(25.9)	260(74.1)	238(67.8)	113(32.2)
Effective	117(25.0)	30(25.6)	87(74.4)	74(63.2)	43(36.8)

"In fact, interaction actually declined because the students were not participating, and when we finally resumed, we had to re-teach and re-go through with them some of the topics we had taught online" (tutor 3).

Table 4: Predictors of the effectiveness of online teaching and learning during the covid-19 lockdown

Characteristics	OR (95% CI)	p>	AOR (95% CI)	p>
Age	0.99 (0.90, 1.09)	0.87		
Gender				
Male	Ref.			
Female	1.02 (0.63, 1.64)	0.95		
Course of study				
General Nursing	Ref		Ref	
Midwifery	0.50 (0.318, 0.79)	0.004	0.56 (0.31, 1.00)	0.05
Mental Health Nursing	0.66 (0.29, 1.52)	0.33	0.64 (0.28, 1.59)	0.34
Public Health Nursing	0.45 (0.19, 1.01)	0.05	0.35 (0.14, 0.89)	0.02
which platform was more effective or simple to use?				
Zoom	1.91 (0.55, 6.60)	0.30		
Google meet	1.86 (1.18, 2.92)	0.007		
others	ref			
Cost of internet				
No	Ref			
Yes	0.76 (0.37, 1.55)	0.44		
Do you have reliable internet?				
No	Ref			
Yes	1.27 (0.79, 2.03)	0.32		
Do you have a reliable power supply?				
No	Ref			
Yes	0.87 (0.57, 1.33)	0.51		
Do you think online and face-to-face lectures be integrated?				
No	Ref		Ref	
Yes	3.10 (1.98, 4.86)	<0.001	0.47 (0.28, 0.81)	0.006
Would you say you were more focused or attentive in the online lectures than you did in face-to-face lectures?				
No	Ref			
Yes	2.36 (1.43, 3.87)	<0.001		
Was the outcome of the online lectures and examinations during the lockdown period better than the previous face-to-face lectures and examination outcomes?				
No			Ref	
Yes	2.36 (1.43, 3.87)	<0.001	0.42 (0.25, 0.70)	<0.001

Challenges with virtual instruction and learning.

Tutors corroborated several challenges reported by students in this study. Poor internet connectivity, high cost of data, restricted or limited time by some online platforms and inability to give group assignments were reported by tutors. Below are excerpts from the interview.

"The first challenge was network issues, considering where my school is there was a problem with the network (tutor 5).

Some tutors had issues with student assessment because students were home and they needed to give group assignments. Compared to face to face, where students meet as a group to discuss and do their assignments, students may be challenged using online platforms for group meetings.

"For me, one other challenge was assessments, and continuous assessment monitoring, because

You will put up assignments or quizzes and you are expecting them to do this assignment in groups but by virtue of their locations will not allow them, and they are also unable to find an appropriate platform to carry out the assignment" (tutor 6).

The challenge of teaching a practical course online was also highlighted by some tutors as captured below. Practical clinical courses require demonstration and due to the abrupt nature of the change to online tutors were not prepared adequately to teach practical courses online. Additional effort is required to teach practical courses as compared to non-practical courses. So those teachers reported having difficulty teaching students online.

"In fact, handling a practical base course makes it a bit difficult for you to just demonstrate practically for them to see especially if the network is not good, even if you have the items in front of you and you are demonstrating it's a bit difficult to capture the activity for them to see as compared if they are sitting right in front of you and you are demonstrating, actually teaching a practical base course that time was difficult" (tutor 2).

Discussion

In unforeseen and unprecedented circumstances, the COVID-19 pandemic has significantly altered how education is delivered to students, including those at Nursing and Midwifery Training Institutions in Ghana. Health Training Institutions had to ensure that core competencies vital to nursing and midwifery continue to be taught and implemented in increasingly virtual environments. This study aimed to document students' and tutors' experiences regarding virtual instruction and learning throughout the COVID-19 lockdown in Northern Ghana. Our study revealed that 75% of the students perceived virtual instruction as less efficient compared to face-to-face. Consistently most students who transitioned to e-learning were less satisfied with online teaching. For example, in a previous survey, just 29.4% of students were contented with the virtual learning setting [23]. Comparably, earlier studies have looked at how students in Ghana experienced online instruction and learning during the COVID-19 shutdown [9,19] and the student's experiences have been below average. Consistent with our study, approximately 68% of students, according to a study done in the United Arab Emirates, stated that traditional face-to-face teaching methods were more effective than e-learning [24]. However, contrary to our findings, a thorough review found that 51.79% of medical students were satisfied with e-learning during the COVID-19 outbreak [15]. The possible reason for this may be the difference in the technology resources available to the students and higher education learners are more mature and are usually more aware of the teaching and learning objectives as well as their responsibilities in the teaching and learning process [25,26]. Students exposed to electronic learning resources show a positive attitude towards e-learning than those who are less exposed. The results of an integrative review also show that certain schools are unable to provide technology-based nursing education due to a lack of resources, which makes students unable to cope with virtual instruction and learning [27].

Throughout the COVID-19 lockdown, nursing and midwifery students in this study were concerned about how the academic year would end and they perceived that the lack of clinical attachment affected their performance in the practical examination. Consistent with this finding is an Indian study which reported that 78.9% of students believed that the epidemic had an impact on their academic performance [28]. Unlike theoretical instructions, practical-orientated courses, as taught in nursing and midwifery colleges, need a carefully implemented e-learning model to be able to deliver the needed clinical competencies. However, for the sudden unplanned transition, e-learning affected the student's practical skills as reported in this study. In order to increase student skills and program outcomes, the nursing profession incorporates theoretical and practical components. However, during the COVID-19 outbreak, it was difficult for nurse educators to teach clinical skills through virtual environments. Because nursing students are required to accrue a specific amount of clinical credit hours by the nursing curriculum and the nursing licensing council, most of the student nurses and midwives were affected by the COVID-19 lockdown [29]. Furthermore, due to the circumstances surrounding the pandemic, patient admissions were limited to COVID-19 instances and emergencies. Because of their uncertainty, practising nurses were unable to mentor, coach, or oversee student nurses [30]. Additionally, due to unforeseen circumstances, various schools also withdrew their students from the clinical sites and therefore, the integration of theory into practice was hindered. The main concern of nurses, students and school authorities stemmed from their worry that they would contract the illness while teaching and learning were taking place at the hospitals. It is clear that the COVID-19 outbreak impacted nursing education.

Despite the global rise in the usage of smartphones and other computerized gadgets [31], one of the challenges for students with virtual instruction and learning throughout the COVID-19 lockdown in this study was the lack of personal computers, tablets, or smartphones to support online learning. As much as 14% of the students did not have a smartphone to join online lectures and most of them reported poor internet connectivity. In this study as elsewhere, just 20% of the students had access to Wi-Fi at home, and the bulk of them attended online classes using mobile data [23,28]. Most of the students had challenges with the cost of internet data, reliable internet connectivity, power outages and interruptions from family and friends. For uninterrupted online class attendance, stable internet and power connectivity are essential. However, frequent power interruptions, as well as poor internet connectivity, have a heavy toll on e-learning. In a systematic review regarding the use of technology, researchers have cited poor connectivity and session interruptions as problems with the use of technology [27]. Electric power and internet connectivity appear to be a problem for the geographical location and institutional capacity to offer technology-based nursing education. For many studies in Ghana, virtual instruction and learning are significantly hampered by the expensive nature of internet usage [9,19,28]. Like in this study, online learning has also been challenged due to the lack of focus by students brought on by domestic distractions and family interruptions because, during the COVID-19 lockdown, many family members were home for long periods [10]. Family interference can be reduced when students have their separate rooms in the house, and this is possible among students from a high social class [28].

Implications of the study

Even though the online teaching and learning helped to effectively mitigate virus transmission during the COVID-19 plague, the Health Training Institutions in Northern Ghana lacked the necessary resources to implement it. The teaching of practical-based programs such as Nursing and midwifery needs a carefully implemented e-learning model to enable the delivery of the needed clinical and practical competencies to students for them to provide competent nursing and midwifery care to health consumers.

Limitations

To begin with, a variety of paradigms can be employed to evaluate the efficacy of teaching and learning; however, the focus of this study was on the participants' perceptions only. the study did not use a Likert scale which better describes perceptions. In addition, because of the expense and length of time involved in constructing measurement tools, the questionnaire that was utilised had not undergone thorough reliability and validity testing. Quantifying poor internet connection involves tracking metrics like bandwidth, latency, packet loss, jitter, and uptime but in this study only used yes/no to indicate the status of internet connectivity. The study was conducted in only 4 of Ghana's more than 100 public nursing and midwifery colleges and only one of Ghana's 16 administrative regions. Further, the respondents were chosen using a non-probability sample method, hence, the generalizability of the study may not be accurate.

Conclusion

Our study revealed that most of the students felt virtual instruction was less effective compared to face-to-face and some students did not have smartphones or computers to join online lectures throughout the covid-19 lockdown. The program of study and the positive perspective of virtual instruction were predictors of effective online teaching. Tutors and students had challenges with the cost of internet data, reliable internet connectivity, power outages and interruptions from family and friends. The government in partnership with telecommunication companies should build robust information technology infrastructure in schools and broaden the internet coverage to remote communities in northern Ghana. Institutions must also provide computers, tablets, as well as reliable and cost-effective internet for all students to support online teaching and learning. Strategies should be implemented to improve the methods used in the E-learning environment to suit the students' learning demands. For instant the use of interactive and engaging content, instituting personal online learning pathways, collaborative learning opportunities like group projects and the provision of regular feedback**.** Stakeholders should rethink how nursing education be offered online, including a revision of the nursing and midwifery curricula to combine both in-person and online learning. Further investigation is required to produce suggestions for addressing

The difficulties related to remote learning in nursing education amidst the COVID-19 pandemic. Finally, before implementing any new software for online teaching, thorough orientation and induction methods are required, along with constant support for nurse educators and their students.

Supporting information: None

Ethical Considerations: The study was exempted from human ethics approval by the ethics committee of the Nurses and Midwifery Training College, Tamale, as it poses no/minimal risk. Permission to perform the research was given by the college (MOH/NMTC/05/18/23).

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