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Perceptions of eLearning Innovative Training Approaches among Nurses, Midwives, and Tutors: A Descriptive Cross-Sectional Study from Nurse-Midwifery Colleges in Tanzania

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Abstract

Background

Africa bears 24% of the global disease burden but is served by only 3% of the world's health workforce, contributing to the continent's failure to achieve the Millennium Development Goals by 2015. The shortage is particularly acute among frontline health professionals such as nurses and midwives. eLearning has emerged as a promising solution for training in-service health workers, offering flexibility and scalability. This study explores the perceptions of eLearning as an innovative training approach among in-service nurses, midwives, and tutors in Tanzania.

Methods

A mixed-methods approach was employed using a semi-structured questionnaire comprising demographic questions and Likert-scale items. A total of 106 in-service nurses and midwives and 10 nursing tutors participated in the study.

Results

Overall, participants expressed positive perceptions of eLearning training approach. Among tutors, 74.3% agreed that eLearning enhanced teaching effectiveness, with over 90% highlighting its potential to expand access, improve efficiency, and necessitate institutional and technological support. Similarly, 79.8% of nurses and midwives reported that eLearning materials and activities supported effective learning. Multivariable logistic regression indicated no statistically significant predictors among tutors; however, favorable trends were noted in perceptions of reduced teaching costs and improved resource access. Among students, being male was associated with significantly lower odds of perceiving eLearning materials as effective (AOR = 0.032), while over 10 years of experience increased the odds of positive perceptions (AOR = 3.3). Students also favored fewer face-to-face lectures and appreciated the diversity of assessment methods in eLearning.

Conclusion

The study highlights strong support for eLearning as a tool to strengthen the health workforce in Tanzania. However, challenges such as limited digital infrastructure and the need for cost standardization persist. Strategic investments and policy support are essential to optimize eLearning implementation and outcomes in resource-limited settings.

Keywords: Nurse, Midwives, Tutors, Training schools, eLearning.

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Introduction

Globally, the healthcare workforce faces significant challenges, with nurses and midwives comprising more than 50% of the entire health workforce. The shortage of skilled healthcare professionals is particularly acute in sub-Saharan Africa, where only 3% of the world's health workers are available to meet 24% of the global disease burden (1). In countries like Tanzania, this shortage is stark, with one nurse midwife serving approximately 1,374 individuals, far below the World Health Organization (WHO) recommended ratio of 1:492 (2). Traditional face-to-face training has been the primary approach to imparting knowledge and skills to healthcare professionals. However, the advent of advanced technologies has introduced eLearning as a viable alternative, offering flexibility, accessibility, and the potential to overcome geographical barriers (3).

E-Learning has become a significant component of healthcare education worldwide due to its flexibility and ability to reach a broad audience. It facilitates the dissemination of up-to-date information and the development of interactive and engaging learning materials. Recognized advantages of eLearning over traditional face-to-face training include its user-friendly nature, cost-effectiveness, and the ability to learn at one's own pace (4). There are numerous advantages of using eLearning approaches to teaching, including (but not limited to): a) flexibility and accessibility: eLearning allows learners to access educational content at their convenience, overcoming geographical and time barriers. This is particularly beneficial for healthcare professionals who often work irregular hours (5); b) cost-effectiveness: eLearning reduces costs associated with traditional education, such as travel, accommodation, and physical classroom infrastructure(6); enhanced learning experience: Incorporating multimedia elements, such as videos, simulations, and interactive modules, can enhance understanding and retention of complex concepts (7).

Despite the advantages of eLearning training approaches, there are some disadvantages arising from such approaches, including a) technological barriers: Limited access to reliable internet and digital devices can hinder the effectiveness of eLearning, particularly in low-resource settings (8); and b) engagement and motivation: Maintaining student engagement and motivation in a virtual environment poses significant challenges. Strategies to foster interaction and active learning are essential (9).

Studies have shown that eLearning can be as effective as traditional methods in terms of knowledge acquisition and skills development. For instance, a study found that nursing students who participated in eLearning courses performed equally well as those who attended traditional classes (7). Moreover, eLearning allows for the continuous professional development of healthcare workers, ensuring they remain up to date with current practices and advancements in their field. The adoption of e-learning in the East African region has been slower compared to other regions due to

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infrastructural and resource limitations. However, several initiatives have been pivotal in promoting e-learning for health professionals in the region. In Tanzania, e-learning has shown promise in addressing the shortage of healthcare workers. Studies have indicated positive perceptions among students and tutors regarding the effectiveness of eLearning, although challenges such as inadequate digital platforms and high costs persist (10). The eLearning program has been implemented in several nursing and midwifery colleges, aiming to enhance the skills and knowledge of in-service nurses and midwives.

In Kenya, there have been positive outcomes from eLearning initiatives. The Amref Health Africa Virtual Training Program has successfully provided continuous professional development for nurses and midwives, enhancing their skills and knowledge (11). The program has received positive feedback, with participants appreciating the flexibility and accessibility of eLearning. In Uganda, eLearning programs in nursing and midwifery education aim to improve access to training and reduce costs. These programs have been well-received, though ongoing challenges related to internet connectivity and digital literacy persist (12). Efforts are being made to strengthen the digital infrastructure and provide adequate support to learners.

Generally, eLearning has the potential to revolutionize nurse-midwifery education globally and specifically in the East African region as it offers flexibility, cost-effectiveness, and enhanced learning experiences, making it an attractive alternative to traditional education methods. To get to its full potential, significant efforts are needed to address technological barriers, maintain student engagement, and standardize eLearning costs. In East Africa, initiatives such as those implemented in Tanzania, Kenya, and Uganda highlight the potential of eLearning to address the shortage of healthcare workers. By enhancing digital infrastructure and providing adequate support to learners, eLearning can play a crucial role in improving the skills and knowledge of healthcare professionals, ultimately contributing to better health outcomes in the region.

Methodology

Settings and Design of the Study

This analytical cross-sectional study was conducted in seven (7) Midwifery colleges implementing the eLearning program in Tanzania. The participating colleges were Bugando School of Nursing (Mwanza), Hubert Kairuki Medical University (Dar es Salaam), Mirembe School of Nursing (Dodoma), Muhimbili Institute of Health and Allied Sciences (Dar es Salaam), Ndanda School of Nursing (Mtwara), Njombe Institute of Health and Allied Sciences (Njombe), and Tanga School of Nursing (Tanga). The colleges selected represented the public, private, and faith-based institutions implementing eLearning program. Data were collected through self-administered structured

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questionnaires from two participant groups: nurses and midwives enrolled in the eLearning program and their tutors.

Selection of Study Participants and Sample Size

Study participants were selected based on two selection criteria: that, a student at the selected college should have a work experience of at least two years practicing as a nurse/midwife and should be attached to the health facility, and the will to participate in the study. The eLearning program focused on upgrading/training in-service nurse midwives from certificate into diploma level for the duration of two years. Selected students attended face to face session for two weeks per semester at the college, they were attached to the district hospitals for clinical rotation and rest of the time had self-studying and serving clients at the health facility. Likewise, all tutors who received training on how to train using the eLearning program were included in the study, from all seven participating colleges. All students and tutors who did not fulfil the inclusion criteria were excluded from the study. With the set inclusion criteria, a total of 106 study participants were recruited into the study, comprising both eLearning nurse-midwife students and their tutors.

Data Analysis

Descriptive data analysis involved producing frequencies and percentages as measures of central tendency. Inferential statistics on the other hand, was based on the predictive logistic regression model with set on two response variables: "Learning materials and activities in the eLearning course helped me to effectively STUDY" for nursing-midwifery students, and "Learning materials and activities in the eLearning course helped me to effectively TEACH" for eLearning tutors. A systematic approach was employed in developing the regression model and started with simple independent variables (predictors) and progressively adding more variables into the model. Univariate analysis was conducted. Predictors demonstrating significant results at a 5% significance level were added to the multivariable model. Ultimately, to achieve the most optimal fitted model, predictors that exhibited multi-collinearity were removed from the model, with the aim of attaining a parsimonious model, which would best capture the associations between the predictor and response variables.

Ethics

The study adhered to the fundamental ethical principles and obtained ethical approval from the National Institute for Medical Research with clearance number NIMR/HQ/R.8a/Vol. IX/3240. Written informed consent was obtained from all study participants prior to interviews. The research data were treated with strict anonymity and confidentiality.

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Results

Demographic Characteristics

The study recruited a total of 106 nurse/midwife students participating in the eLearning program. The majority of the nursing-midwifery students were females 60.4%, n=64), and nearly all (97.2%) were younger than 40 years old. Nearly half of nurse/midwife students (48.1%, n=51) worked in hospitals (Table 1), whereas the rest worked either in dispensaries (27.5%) or in health centres (24.5%). At the time of the study, only 5 of the nurse/midwife students had graduated from their eLearning program, while most of them were current students (95.3%). On the other hand, the study recruited 10 eLearning tutors, the majority of whom were females (80%, n=8), and 60% of study tutors were aged between 40 and 60 years old. Likewise, 60% of the study participating tutors had work experience of more than ten years (60%, n=6) in teaching nursing and midwifery training schools.

Table 1: Characteristics of nurses and midwives (n=106)

Characteristics	No. (%)
Gender	
Female	64(60.4)
Male	42(39.6)
Age	
Younger than 40	103(97.2)
40-60	3(2.8)
Older than 60	0(0)
Working station	
Dispensary	29(27.4)
Health centre	26(24.5)
Hospital	51(48.1)
E-learning status	
Graduated	5(4.7)
Current students	101(95.3)

Perceptions of tutors towards the innovative eLearning approach

Concerning innovative approach of the eLearning program, quantitatively tutors perceived (90% or above score) of the following attributes i) provides massive education for learners, ii) needs well prepared online materials, iii) needs sufficient training courses for implementation, iv) institutional recognition of eLearning is important v) needs establishing evaluation mechanism vi) provides

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efficiency in teaching, vii) needs establishing support services such as multimedia, viii) variant teaching strategies are required ix) standardizes the content of course materials, x) Technological infrastructure strengthening is crucial. Overall, tutors reported a 74.3% degree of consensus that learning materials and activities in the eLearning course helped them to teach their students more effectively and efficiently (Table 2).

Table 2: Characteristics of tutors (n=10)

Characteristic	No. (%)
Gender	
Female	8 (80.0)
Male	2 (20.0)
Age (years)	
Younger than 40	2 (20)
40-60	6 (60)
Older than 60	2(20)
Work experience	
Less than 10 years	4 (40)
More than 10 years	6 (60)
College	
Bugando School of Nursing	1 (10)
Hubert Kairuki Memorial University	2 (20)
Mirembe School of Nursing	1 (10)
Muhimbili University of Health and Allied Sciences	2 (20)
Ndanda School of Nursing	2 (20)
Njombe Institute of Health and Allied sciences	1 (10)
Tanga School of Nursing	1 (10)

Perceptions of tutors on learning materials and activities in eLearning for teaching

Tutors reported to have positive perceptions of eLearning with overall rate score (sCns=74.3%). Tutors strongly agreed that the learning materials and the activities in the eLearning program had helped them to effectively teach (40%, n=4), and (20%, n=2) agreed and (20%, n=2) were undecided (Table 3).

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Table 3: Perceptions of tutors towards the innovative eLearning approach

Variable	n	SA n (%)	A n (%)	N n (%)	D n (%)	SD n (%)	sCns (%)
Saves time and efforts of both teachers and students	10	3 (30)	6 (60)	0 (0.0)	1 (10)	0 (0.0)	81.6
Technological infrastructure is crucial	10	7 (70)	3 (30)	0 (0.0)	0 (0.0)	0 (0.0)	94.2
Provides rich resources	10	4 (40)	6 (60)	0 (0.0)	0 (0.0)	0 (0.0)	88.4
Provides massive education for learners	10	5 (50)	5 (50)	0 (0.0)	0 (0.0)	0 (0.0)	90.4
Needs well prepared online materials	10	6 (60)	4 (40)	0 (0.0)	0 (0.0)	0 (0.0)	92.3
Needs sufficient training courses for implementation	10	7 (70)	2 (20)	1 (10)	0 (0.0)	0 (0.0)	92
Institutional recognition of eLearning is important	10	8 (80)	2 (20)	0 (0.0)	0 (0.0)	0 (0.0)	96.2
Needs establishing evaluation mechanism	10	8 (80)	2 (20)	0 (0.0)	0 (0.0)	0 (0.0)	96.2
Sufficient ground work is required	10	5 (50)	4 (40)	1 (10)	0 (0.0)	0 (0.0)	88.1
Provides efficiency in teaching	10	5 (50)	5 (50)	0 (0.0)	0 (0.0)	0 (0.0)	90.4
Establishing support services such as multimedia	10	8 (80)	2 (20)	0 (0.0)	0 (0.0)	0 (0.0)	96.2
Variant teaching strategies are required	10	6 (60)	4 (40)	0 (0.0)	0 (0.0)	0 (0.0)	92.3
Standardizes the content of course materials	10	6 (60)	4 (40)	0 (0.0)	0 (0.0)	0 (0.0)	92.3
Minimizes costs of teaching and learning	10	4 (40)	5 (50)	1 (10)	0 (0.0)	0 (0.0)	86.2
Implementation should be gradual	10	3 (30)	3 (30)	3 (30)	1 (10)	0 (0.0)	75
Difficulty in monitoring and evaluation process	10	1 (10)	4 (40)	1 (10)	3 (30)	1 (10)	57.8
Easy to monitor teaching and learning processes	10	2 (20)	3 (30)	3 (30)	2 (20)	0 (0.0)	68.2
Results in decline in learners' achievement	10	0 (0.0)	0 (0.0)	1 (10)	6 (60)	3 (30)	21.5
Causes fragmentation of work and loss of consistency in learning	10	0 (0.0)	3 (30)	0 (0.0)	4 (40)	3 (30)	37.1
Reduces teamwork and collaboration between students	10	3 (30)	0 (0.0)	4 (40)	0 (0.0)	3 (30)	53.4
Learning materials and activities in the eLearning course helped me to effectively TEACH	10	4 (40)	2 (20)	2 (20)	2 (20)	0 (0.0)	74.3

SA = Strongly Agree; A = Agree; N = Neutral; Dis = Disagree; SD = Strongly Disagree; SDev =

Standard Deviation; sCns = Measure of strength of consensus

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Perceptions of nurses and midwives towards the innovative eLearning approach

Nurses and midwives were found to have positive perceptions of eLearning innovative approaches. The overall degree of consensus was sCns=79.8% among nurses and midwives (Table 4). The majority of nurses and midwives (58%, n=62) agreed that learning materials and activities in the eLearning helped them to effectively study, while (22%, n=23) had strongly agreed (Table 5).

Table 4: Perceptions of tutors on learning materials and activities in eLearning for effective teaching

Variable	COR (95% CI)	Std. Error	P >|z|	AOR (95% CI)	Std. Error	P >|z|
Gender						
Female (reference)	1			1		
Male	3.0 (0.19-45.2)	4.1	0.43	0.02 (0.02-63)	2.5	0.97
Age	0.34 (0.1-6.0)	0.34	0.45	1.6 (0.5-7.9)	3.7	0.56
Working experiences						
Less than 10 years (reference)	1			1		
More than 10 years	6.7 (0.1-14.0)	6.7	0.36	3.2 (0.3-24)	6.7	0.66
Likert scale variables						
Minimizes costs of teaching and learning	4.5 (0.18-106)	7.2	0.35	4.8 (0.07-330)	10.3	0.48
Provides massive education for learners	4.5 (0.18-106)	7.2	0.35	5.7 (0.08-330)	11.1	0.47
Provides rich resources	4.5 (0.18-106)	7.2	0.35	10.5 (0.26-427)	19.8	0.21
Results in decline in learners' achievement	0.33 (0.02-5.03)	0.5	0.43	0.96 (0.015-58)	2.01	0.98

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Table 5: Perceptions of nurses and midwives towards the innovative eLearning approach

Statement	n	SA n (%)	A n (%)	N n (%)	Dis n (%)	SD n (%)	sCns (%)
Perceived usefulness / ACCEPTABILITY							
This eLearning course offers a variety of ways to assess my learning (quizzes, written work, forums, etc.)	106	26 (24.5)	55 (51.9)	21 (19.8)	4 (3.8)	0 (0.0)	79.2
I receive the teachers' comment/feedback on an assignment in less than 7 days	106	20 (18.9)	41 (38.7)	30 (28.3)	12 (11.3)	3 (2.8)	70.3
The prepared learning material and tasks are consistent with the lectures in the classroom and supplement them	106	20 (18.9)	49 (46.2)	28 (26.4)	7 (6.6)	2 (1.9)	73.8
The prepared learning material and assignments supplement the tutorial in the classroom	106	22 (20.8)	53 (50.0)	27 (25.5)	3 (2.8)	1 (0.9)	76.9
The teacher gives me feedback/a response on my submissions (assignment, forum posts)	106	26 (24.5)	57 (53.8)	19 (17.9)	3 (2.8)	1 (0.9)	79.3
Perceived ease of use / FEASIBILITY							
The study material and tasks of the eLearning course are presented in a clear and understandable way	106	24 (22.6)	46 (43.4)	31 (29.3)	4 (3.8)	1 (0.9)	76
Finding certain activities in the eLearning course is simple	106	19 (17.9)	55 (51.9)	24 (22.6)	7 (6.6)	1 (0.9)	75.2

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General questions						
The virtual classroom of the course is organized transparently	106	24 (22.6)	57 (53.8)	22 (20.8)	3 (3.1)	0 (0.0)	79.1
The goals (workload demands, grading) of this eLearning were clearly stated at the start of the course	106	28 (26.4)	49 (46.2)	19 (17.9)	9 (8.5)	1 (0.9)	76.7
I prefer fewer lectures in the traditional way (face-to-face) and more learning materials in the eLearning course	106	17 (16.0)	49 (46.2)	25 (23.6)	11 (10.4)	4 (3.8)	70.5
More tutorials in the course could be carried out in the eLearning course instead of the classroom	106	19 (17.9)	40 (37.7)	20 (18.9)	20 (18.9)	7 (6.6)	65.5
My general impression of the eLearning is good	106	22 (20.8)	51 (48.1)	27 (25.5)	5 (4.7)	1 (0.9)	76
Learning materials and activities in the eLearning course helped me to effectively STUDY	106	23 (21.7)	62 (58.5)	18 (17.0)	3 (2.8)	0 (0.0)	79.8

The multivariable logistic regression findings from tutors reported statistically insignificant higher odds of consensus that materials and activities in the eLearning minimize costs of teaching (AOR: 4.8; 95%CI: 0.07-330); provide rich resources (AOR: 10.5; 95%CI: 0.26-427); eLearning results in decline in learners' achievement (AOR: 0.96; 95%CI: 0.02-58); age (AOR: 1.6; 95%CI (0.5-7.9) and work experience (AOR: 3.2; 95%CI (0.3-24) (Table 4).

Perceptions of nurses and midwifes on learning materials and activities in eLearning for effective study

The results from nurses and midwives revealed higher odds of consensus to the statement *"learning materials and activities in eLearning for effective study"*. Having more than 10 years of experiences insignificantly increased the odds of consensus (AOR: 1.6; 95%CI (0.5-8.9); gender lowered odds

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as compared to female (AOR: 0.02; 95%CI (0.02-3). There were insignificant higher odds in the statement "eLearning course offers a variety of ways to assess my learning" (AOR: 8.7; 95%CI (0.08-20) and lower odds to "More tutorials in the course could be carried out in the eLearning course instead of the classroom" (AOR: 0.98; 95%CI (0.017-57) (Table 6).

Multivariable regression analysis results showed that being a male nursing-midwifery student was about 30 times less likely to perceive the effectiveness of the learning materials and activities in the eLearning program (AOR = 0.032, 95% CI=0.02-3). On the other hand, compared to nurse-midwifery students with less work experience, having worked for more than 10 years was found to be over three times more likely to perceive the effectiveness of the learning materials and activities in the eLearning program (AOR = 3.3, 95% CI=0.3-25).

Also, nursing-midwifery students participating in the eLearning program were about 15 times more likely to prefer fewer lectures in the traditional way (face-to-face) and more learning materials processes in the eLearning course compared to more lectures (AOR = 15.3, 95%CI = 0.45-67). Furthermore, students were nearly 9 times more likely to perceive that the eLearning course offers a variety of ways to assess learning (quizzes, written work, forums, files, etc.) (AOR=8.7, 95%CI = 0.08-20). Interestingly, results also showed that having more tutorials carried out in the eLearning course had similar odds as conducting them in the classroom (AOR=0.98, 95% CI= (0.017-57).

Table 6: Perceptions of nurses and midwifes on learning materials and activities in eLearning for effective study

Variable	COR (95% CI)	Std. Error	P >|z|	AOR (95% CI)	Std. Error	P >|z|
Gender						
Female (reference)	1	-	-	1	-	-
Male	3.2 (0.19-8.2)	4.5	0.48	0.032 (0.02-3)	2.7	0.96
Age	0.3 (-0.1-6.0)	0.26	0.44	1.6 (0.5-8.9)	3.9	0.57
Working experiences						
Less than 10 years (reference)	1	-	-	1	-	-
More than 10 years	6.4 (0.1-14.0)	7.7	0.37	3.3 (0.3-25)	6.9	0.67
Likert scale variables						
The study material and tasks of the eLearning course are presented in a clear and understandable way	3.6 (0.18-13)	8.9	0.4	5.6 (0.07-30)	11.4	0.52
This eLearning course offers a variety of ways to assess my learning	4.7 (0.17-56)	8.8	0.45	8.7 (0.08-20)	14.1	0.57

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(quizzes, written work, forums, files, etc.)					
I prefer fewer lectures in the traditional way (face-to-face) and more learning materials processes in the eLearning course	14.5 (0.18-32)	9.2	0.57	15.3 (0.45-67)	19.9	0.25
More tutorials in the course could be carried out in the eLearning course instead of the classroom	0.9 (0.73-9.06)	0.5	0.43	0.98 (0.017-57)	8.01	0.89

Discussion

This section focus on four key results areas which includes, first the perceptions of tutors towards the innovative eLearning approach was 90% and above (Table 3), second the perceptions of tutors on learning materials and activities in eLearning for effective teaching (sCns74.3%) Table 4 Minimize cost of teaching and learning (0.48), provides massive education for learners (0.47), Third the perceptions of nurses and midwives towards the innovative eLearning approach 79.8% (Table 5) and Fourth the perceptions of nurses and midwifes on learning materials and activities in eLearning for effective study, the study materials and tasks of eLearning are presented in clear and understandable way (0.52), eLearning course offers variety of ways to assess the course (0.57), more tutorials in the course could be carried in eLearning course instead of classroom (Table 6).

The study provides data on an initial attempt to understand tutors' perceptions on effective learning and teaching processes in eLearning programs. Tutors had a positive perception of eLearning since it minimizes costs, provides an effective teaching and learning process, and provides rich resources to the learners, similar to Finland (13). This inadequacy of resources and platforms for sharing, communicating and eLearning aspects perhaps lowered students' and tutors' perceptions of the teaching and learning process (14,15). This is possibly explained that tutors used different methods of sharing with students so as to boost their innovative learning, similar to findings from Kenya and Malawi, which reported that WhatsApp and emails were commonly used (16,17). This similarity is perhaps evidenced that for the effective supervision and mentorship in the eLearning program perhaps require a variety of communication technological mechanisms such as WhatsApp and emails (16).

The study pointed out that eLearning materials and activities help tutors/mentors to teach effectively, although there was evidence of non-functional eLearning platforms. This aligned with

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South Africa's findings, which said that e-Learned students easily interact in learning when these platforms and the internet are stable (18). The study found that participants still accept platforms and the internet. This can be explained that despite difficulties still these potential stakeholders positively perceive eLearning programs (18,19).

Additionally, the tutors somehow felt that it is not easy to monitor the teaching and learning processes during the eLearning implementation, which may be caused by the internet and unstable information and communication technology (20,21)(19). This observation can perhaps be linked to the lack of eLearning platforms (eCampus and Jibu applications) that led to the failure of tutors in uploading study materials and administering assignments, and inadequate communication with their eLearning students, contrary to what has been reported in Croatia (15).

The study found that students' perceptions were positive in such a way that it is easy to use through technological and interlinked eLearning platforms, for example, Jibu, eCampus, and WhatsApp in Kenya (9,16,22). The study findings from the students' perspective found that there were no officially established platforms in the eLearning programs, contrary to findings from the United States of America and Slovenia, whereby emails and web-based systems were commonly used (19). Despite there being no specific established platforms, these platforms were perceived to be useful and easy to use by the nurses and midwives, as highlighted in Iraq and Canada (7,23). This needs more operational research to triangulate the current findings, since it has imposed some unanswered questions if they are available. This is because participants themselves differed in that some reported, but others said they were not there. These platforms are important for communication and sharing materials (9,24).

The findings were contrary to the previous study, which clearly emphasised on integration of online training programs, including eCampus and Jibu platforms in training institutions (25). This can be explained that further studies may enrich evidence because at this point is introduces some inconsistency contrary to findings in Kenya (26). Nurses and midwives reported that the transport costs, which are incurred during the clinical sessions, are higher than those during the face-to-face sessions. This possibly includes internet and other indirect expenses could be the reason why it is high in South Africa, Malawi, and Tanzania (1,13,(18). This finding is contrary to what we expected, that eLearning students are attached to the higher-level health facilities at or near their workstation of which could have led them lower costs (20). This implies that eLearning courses are designed with high estimated costs (transport, accommodation, and food); perhaps students have to be well-informed before they start an eLearning program. This probably later will not be a barrier to enrolment or continuation among the eLearning beneficiaries (17,18).

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The rated items and demographic characteristics had insignificant positive odds of consensus to the overall rated items (effect Teach and Study) (26). Thus, there were positive perceptions on the eLearning program that increases innovation to tutors and e-Learned students, of which concurred to the findings in Tanzania (7). The study identified that many efforts are needed in terms of policies and guidelines so as to change negative perceptions of some tutors since they can demoralize, discourage, and increase discontinuation rates of the e-Learned nurses/midwives. This is possibly because some of the participants said that eLearning results decline in nurses' performance.

and eLearning implementation is gradual. This negative perception was experienced even in other studies, like in Turkey, Kenya, Malawi, and Tanzania (7,17,22,27). However, this negative perception of a few participants did not overthrow the significance of the e-learning program towards innovation in Tanzania.

This study significantly impacts the health sector by demonstrating that eLearning training programs for in-service nurses and midwives effectively reduce the shortage of healthcare workers in health facilities. Participants in the program enhanced their skills and knowledge through a blended training approach, which included face-to-face sessions, self-study, electronic learning, and concurrent community service. Furthermore, the program influenced policy changes in the health sector, leading to the development and adoption of new curricula and implementation guidelines for nurse midwifery training in Tanzania.

Strengths and limitations

The study collected primary data of which helped to bring strong information of the eLearning program on the perceptions of eLearning towards innovative approaches. The study used more than one tool for data collection of which helped in triangulating findings. The current study extended the analysis to logistic regression so as to have inferential statistics evidence. The study included participants who are in the program implementation settings. This helped to reflect the real situation in the practical settings. The study is of importance since it can mark the significance of reviewing the teaching and assessment modes in the eLearning program. Additionally, for the best of our knowledge, the current study is a formative evaluation, and since inception of the eLearning program, there has been inadequate information on perceptions towards eLearning innovations in Tanzania. The study will add to the body of knowledge, especially on the learned experience and lessons learnt in the projects for future implementations.

The study suffered from prevalent rate and reporting biases because it was cross-sectional designed. It is anticipated that the majority of respondents probably overestimated their rating score towards perceptions on the teaching and learning of eLearning innovation. The study was limited with the variety of responses attained or the data collection method used (self-administered survey)

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that participants were not able to fully articulate on the questions. The study suffered from failure in measuring the exact eLearning innovation, which can be experienced after completion of the program. This is because the current did not establish a cohort for follow-up. Again, the sampled population was small when compared with the total number of nurses and midwives who have graduated or are currently enrolled in the programs. The study suffered from overestimation of the odds ratio in the multivariable logistic regression; this, perhaps, is due to the small sample size or design effects. Despite this limitation, the current study findings concurred that there was an increasing odd of consensus towards eLearning innovative with exceptional in among male as compared to female.

Conclusion

Tutors have positive perceptions of the eLearning program as an innovative approach of teaching and learning in nurse training schools. Despite the benefits evidenced, tutors face difficulties in monitoring of the teaching processes during the eLearning implementation due to inadequate eLearning platforms. Students perceived eLearning platforms as a best and quick learning approach; however, there is inadequate learning platforms that fulfill their learning requirements. There were insignificant higher odds of consensus across the rated statements and demographic characteristics among males as compared to females. Thus, the study revealed there are higher benefits of eLearning for innovative approach achievements among tutors and nurses/midwives. The study highlights that many efforts are still needed, such as establishing strategies for changing the negative perceptions of some nurses/midwives and tutors, standardizing eLearning costs, internet connectivity, and activating eLearning platforms for accelerating effective teaching and learning in Tanzania.

List of Abbreviations

NIMR	National Institute for Medical Research
GSK	Glaxo Smith Kline
ICD	Institute of Capacity Development
OR	Odds Ratio
AOR	Adjusted Odds Ratio
CI	Confidence interval
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly, and Children
IMF	Institutional Management Framework
sCns	Degree of Consensus

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Declarations

Authors are declaring that this manuscript is our original work had never been submitted to any other journal for publication and will not be submitted to any other for similar or any other for similar purpose. All sources of information used have been acknowledged.

Availability of Data and Materials

The data that support the findings of this study are available from Amref and GSK. Data are, however available from the authors upon request and with permission from Amref and GSK.

Authors' Contributions

PM and LK conceptualized the original idea. GK, JM, AN participated in data collection, analysis, and interpretation of results. AK, RM, VM drafted the manuscript, coordinated, and reviewed the manuscript. All authors reviewed and agreed on the final draft of the manuscript.

Consent for Publication

The permission to publish these findings is granted by NIMR (MOH), Amref, and GSK after being informed about the study findings.

Competing interests

The authors declare that they have no competing interests.

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