IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 12, Issue 1 Ser. V (Jan. – Feb. 2023), PP 31-40
www.iosrjournals.org

Satisfaction with Simulation-based Learning and Associated Factors among Public Health Science College Students in Amhara region, Ethiopia, 2021

Alebachew Abat*[1], Gebeyehu Tsega[2], Gebremariam Getaneh[2]
**Corresponding authors; AlebachewAbatemail:alebachewabat23@gmail.com*
1. Department of Nursing, Bahir Dar Health Sciences College, Ethiopia.
2 . Health System Project Management and Health Economics, School of Public Health, Bahir Dar University, Ethiopia

ABSTRACT
Background*: Simulation-based learning is a highly successful teaching and learning method. However,it is underutilized or ineffectively offered in low and middle income countries. There is little evidence on satisfaction related to Simulation-based learning among level based public health science college students in Ethiopia.*
Objective: *To assess level of satisfaction with Simulation-based learning and associated factors among level-based public health science college students, Amhara, Ethiopia, 2021.*
Methods: *Institution -based cross sectional study was employed from September 6th up to October 6th, 2021 in public health science colleges in Amhara region among 422 level-based under graduate health science students.The participants were selected using systematic random sampling technique. The data was coded, entered and cleaned using Epi-data version 4.2 and exported to Statistical Package Social Software version 25 for analysis. Binary logistic regression analysis was computed to assess satisfaction withSimulation-based learning and associated factors. Adjusted Odds ratio with its 95% Confidence interval was reported and P-value < 0.05 was considered as statistically significant.*
Results
Proportion of students' satisfaction with simulation -based learning was 188 (45.6%). Students perceived presence of active learning (AOR =2.9, 95% CI=1.69-5.0), collaboration (AOR=2.09, 95% CI=1.17-3.73), objective (AOR=2.25, 95%CI=1.31-3.86) and presence of problem solving (AOR=2.65, 95%CI=1.47-4.76) were significantly associated to satisfaction with simulation- based learning.
Conclusion
The overall proportion of satisfaction with simulation - based learning was low. Active learning, collaboration, problem solving and clear objective were significantly associated to satisfactionwith simulation - based learning. Therefore, health bureau and health science college managers should strengthen simulation based learning practice to be incorporated in the curriculum.
Key words: *Satisfaction, simulation- based learning, level based.*

Date of Submission: 12-02-2023 Date of Acceptance: 23-02-2023

I. Introduction

Simulation-based learning (SBL) is a method of teaching and learning for substituting real-life experiences (1).It is a preferable method for teaching learning processes, for different technical and nontechnical skills (2).Globally,simulation- based learning practice has increased and widespread (3, 4).In the United States of America , simulation is quickly becoming as pedagogical instruction for undergraduate clinical students(5).

Simulation is classified as role-playing, standardized patient simulations, manikins (human model) and computer simulations (6). Simulation- based learning (SBL) gives advantage for students in the development of self-evaluation, time management, teamwork, clinical decision-making and communication skills for patient safety and care (6, 7). It also allows students to practice procedures and familiar with clinical situation (8).

Student satisfaction is vital in medical education because it influences teaching and learning processes, as well as the use of simulation-based learning strategies (9).In middle east and north Africa, indicated that high level of satisfaction with simulation -based learning (10).But high satisfaction with the simulated practice does not always convert to strong clinical performance (11). Because of simulation- based learning practice had many impeding (challenging) factors in Middle East and low income countries(12, 13).

Ethiopia's health workforce, requires ongoing skill development to accomplish long-term development goals and universal health coverage(14) ,to accomplish this simulation centers indifferent teaching hospitals have been established with long standing international collaboration of stake holders but utilization of SBL in Ethiopia was not reported and innovative in various medical education field specialities(15-17) .

Globally, Simulation- based learning was escalated and medical education has changed dramatically all over the world from traditional lecturing towards technology supported SBL (18). Despite thatfresh graduates lack technical and non-technical skills in health institutions worldwide(19).In the USA, all graduates experience indicated theory and practice gap on their shift to clinical practice(20). A study that is conducted Ireland reported that about 55% the students are poor in 3 or more skills (21).

In lower middle income countries (LMICs) since simulation- based learning is underutilized (13, 22).For example, in Cameron simulation- based learning practice had constraints in which hospital patients are used for clinical practice before students were exposed to simulation(23). Moreover like Tanzania and Kenya simulation- based learning as pedagogical instruction little implemented(24).In Kenya a research stated challenges arise due to unfamiliarity of SBL(25)

Like to other sub-Saharan countries, Ethiopia lacks sufficiently skilled health professionals (26).For example a study done in Ethiopia stated that the overall level of competency in pre service education among midwifery students was low (51.8%) (27).Similarly other study done in Ethiopia among nurse students their level of clinical competency was low (48.7%) (28). Moreover, other study conducted in Mettu university, Ethiopia students underscored in clinical practice competency which was 24.5%(29).In Ethiopia SBL is relatively new, less considered and usage of strategies(16, 30) ,little studies revealed under graduate midwifery students had lower satisfaction than other regions(31, 32).

Factors affecting simulation-based education include students' school years, desired learning styles, perceived degrees of assistance, problem-solving possibilities, perceived degrees of fidelity, participant experience, work shop design, time constraint, teachers knowledge and training, Equipment and number of students (33-37).In order to analyze factors associated with simulation based learning, national league for nursing/Jeffries in 2005and 2007 developed Simulation Framework/model to define variables as participant (example: program, age, level), facilitator (example: demographics), educational practice (example: active learning, feedback, interaction), simulation design (example: objectives, problem solving, student support) and outcome variable (example: learner satisfaction) (38).

Solutions designed for SBL practice challenges were improvisational equipment, low-cost simulation software adaptation, context-specific curricula design, local administrative support, and the formation of a simulation fellowship opportunity for local educators (22). In other studies indicated solutions were improving teaching- learning environment, use of pre briefing and debriefing as strategy (12, 27)

From observation, quarterly and annually college reports(39) about student's low level of competency, simulation- based learning and hindering factors were raised problems. There is little evidence on satisfaction related to simulation based learning among level- based public health science college students in Ethiopia. More over organizational factors related to satisfaction with simulation based learning included in this study were not studied in Ethiopia. Therefore, the aim of this study is to assess student satisfaction with simulation -based learning and associated factors among level based public health science college students in the Amhara region.

Conceptual frame work

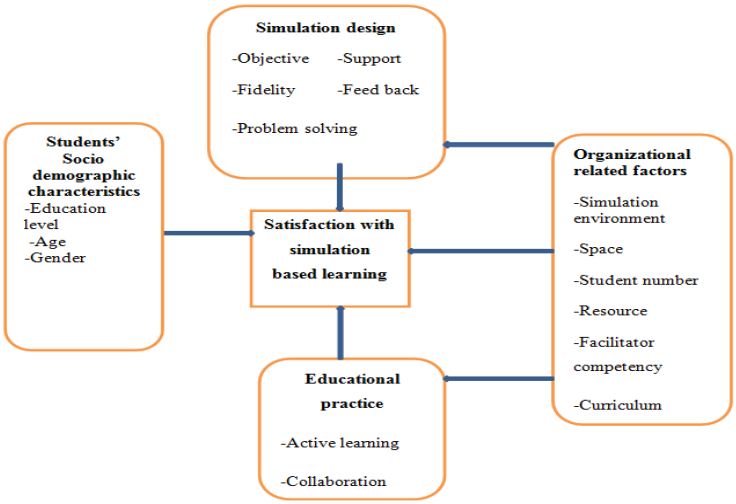

Figure 1: Conceptual frame work of satisfaction with SBL practice and associated factors among level -based public health science college students, Amhara, Ethiopia was adapted(12, 23, 31, 32, 38, 40).

OBJECTIVES

General objective

- To assess level of satisfaction and associated factors of simulation -based learning among level- based public health science college students, Amhara , Ethiopia, 2021.

Specific objectives

- To determine level of satisfaction with simulation -based learning among level- based public health science college students in Amhara region, Ethiopia, 2021.
- To identify factors associated to satisfaction with simulation- based learning among level based public health science college students, Amhara , Ethiopia, 2021.

II. Methods And Materials

Study area and period

The study was conducted in under TVET public health science colleges in Amhara regional state specifically Bahir Dar, Tseda, Debre Tabor, Dessie and DebreBirhan health science colleges. Bahir Dar health Science College which is located in Bahir Dar city, 565 km far from Addis Ababa and has delivered level-based education to programs of Nurse, midwife, Anaesthesia, Health extension, Health informatics, Radiography, Pharmacy and laboratory departments with a total 1087 number of students.

Debre Tabor health Science College is located at Debre tabor town and delivers level- based education for health programs with a total of 1067 students. Tseda health Science College is located in Gondar city with a total of 1500 students. Dessie health Science College is located in southern wollo zone with a total of 1441 students and Debrebirhan health Science College is located in northern shewa zone with a total of 1038 students (39).The data were collected from September 6th up to October 6th, 2021.

Study design

Institution- based cross sectional study was conducted

Population

Source population

All public level- based health science college students in Amhara regional state

Study population

All level -based health science college students in selectedhealth science colleges of Bahir Dar and Tseda

Eligibility criteria

Inclusion criteria

- ✓ Students who attended at least one clinical attachment in skill practice.

Exclusion criteria

- ✓ Students who had no clinical practice experience

Sample size determination and sampling technique

Sample size determination

The sample size was determined using a single population proportion formula by assuming 50%satisfaction ,no study done on level of satisfaction among level- based students and a 95% confidence level, 5% level of precision, as well as 10% non-response rate.

$$n = \frac{(Z\alpha/2)^2 p(1-p)}{d^2}$$

n = Minimum sample size

Z α/2 = Z value at 95% CI (1.96)

p = Assumed level of satisfaction 50% (0.5)

d = Margin of error 5% (0.05)

n= z 2 P (1-p)/ d2 =1.96^2 x (0.5(1-0.5))/0.05^2 = 384

Therefore by adding 10% nonresponse rate , the total sample size of the study was 422 students.

Sampling technique

There are 5 level- based public health science colleges in Amhara region. First the two colleges(Bahir Dar and Tseda Health science colleges)were randomly selected and these college students' proportionally allocated. There are a total of 1087 students in Bahir Dar health science college and about 177 participants were recruited. In Tseda health science college also there are a total of 1500 level- based health science students and about 245 participants were recruited proportionally. The final sample was taken by using systematic random sampling technique and kth –interval (k=6) of students in each class. The first participant was selected using the lottery method.

Variables

Dependent variable

- Satisfaction with simulation -based learning

Independent variables

- Socio-demographic characteristics; Age, gender, level of education
- Educational practice related factors;Active learning, Collaboration
- Simulation design related factors;Objective ,Support, Fidelity, feedback, Problem solving
- Organizational related factors;Simulation environment ,Space, Number of students, Resource, Facilitator competency, Curriculum

Data management and analysis

Data collection tools

The data were collected using standardized questionnaire adapted from national league for nursing/Jefferies(41)collection toolto measure students' satisfaction with simulation- based practice related to their agreement using 5-point likert scale. The questionnaire were contained satisfaction with current learning (9 items), socio demographic characteristics (3items), educational practice related descriptions (6 items), and simulation design related descriptions (9 items) and organizational related variables(20 items) adaptedfrom federal technical vocational education and training (FTVET) standards (42). It was translated to local language into Amharic version and then it was returned back to English language by language experts. Three BSC nurses for data collection and three MSC /MPH health professionals for supervision who were not in the study area were selected.The questionnaire was self-administered.

Data quality assurance

Data quality was assured through training of data collectors on objectives and questionnaire. Pre-test was conducted in Alkan health science private college among 5% of sample size in two weeks before deployment for data collection. After pre-test any ambiguity, confusions, difficult words and differences in understanding were revised based on pre-test experience. Reliability and validity of the tool was conducted. Cronbach's coefficient alpha value was 0.73. Completeness and consistency of questionnaire were checked before and immediately after collecting by each data collectors and supervisors.

Data analysis

The collected data were checked for its completeness and coded data were entered to epidata version 4.1 and then exported to SPSS version 25 for more data cleaning and analysis. A bi variable analysis was used to find the association of independent variables. Variables with p-value <0.25 in Bi variable analyses were selected to multivariable analysis. Adjusted Odds ratio with its 95% CI was reported and a p- value < 0.05 was considered as statistically significant.

Ethical clearance

Ethical clearance was obtained from institutional review board (IRB) ofBahir Dar University on date 05/01/2014 E.C, Ref. No. Medical /3016/24 .Formal letter was submitted to selected public health science colleges. Written informed consent was obtained from individual participant. Participants were informed, they had full right to refuse/withdraw from participation. Individual confidentiality was secured.

III. Results

Socio demographic characteristics of participants

In the study 422 students were enrolled and the response rate was 412 (97.6%). More than half of participants 211(51.2%) were females. The majority of participants 244 (59.2%) were in age group of 20-24 years old with a median age of 22 years (IQR 18-35).It was observed that 301(73.1%) participants' educational status were level- IV and the least participants 19(4.6%) were level –V students (Table1).

Table 1: Socio demographic characteristics of level- based public health science college students, Amhara , Ethiopia, 2021.

Characteristics	Category	Frequency(N)	Percentage (%)
Sex	Female	211	51.2
	Male	201	48.8
Age group	<20 years	83	20.1
	20-24 years	244	59.2
	>=25 years	85	20.6
	Level-III	92	22.3
Education level			

Level-IV	301	73.1
Level-V	19	4.6

Educational practice related factors

Among the study participants 219 (53.2%) and 289 (70.1%) were dis agree in active learning and collaboration learning respectively.It was apparent that students perceived educational practice sub scale elements were active learning median score 19, IQR (5-25) followed by collaboration learning median score 4,IQR (1-5).

Table 2:Educational practice of level- based public health science college students, Amhara , Ethiopia, 2021.

Educational practice sub variables	Category	Frequency(N)	Percent (%)	Median
Active learning	Disagree	219	53.2	
	Agree	193	46.8	19
Collaboration learning	Dis agree	289	70.1	
	Agree	123	29.9	4.0
Total		422	100	

Simulation design related factors

More than half study participants were disagree with objective and information 207(50.2%), support 225(54.6%), problem solving 257(62.4%), feedback 224(54.4%) and fidelity of SBL 336(81.6%) respectively. It was observed that students perceivedproblem solving received highest medianscore11, IQR (3-15) followed by objective and information median score7, IQR (2-10) and finally fidelity had lowest median score 1.0, IQR (1-2) (figure 3).

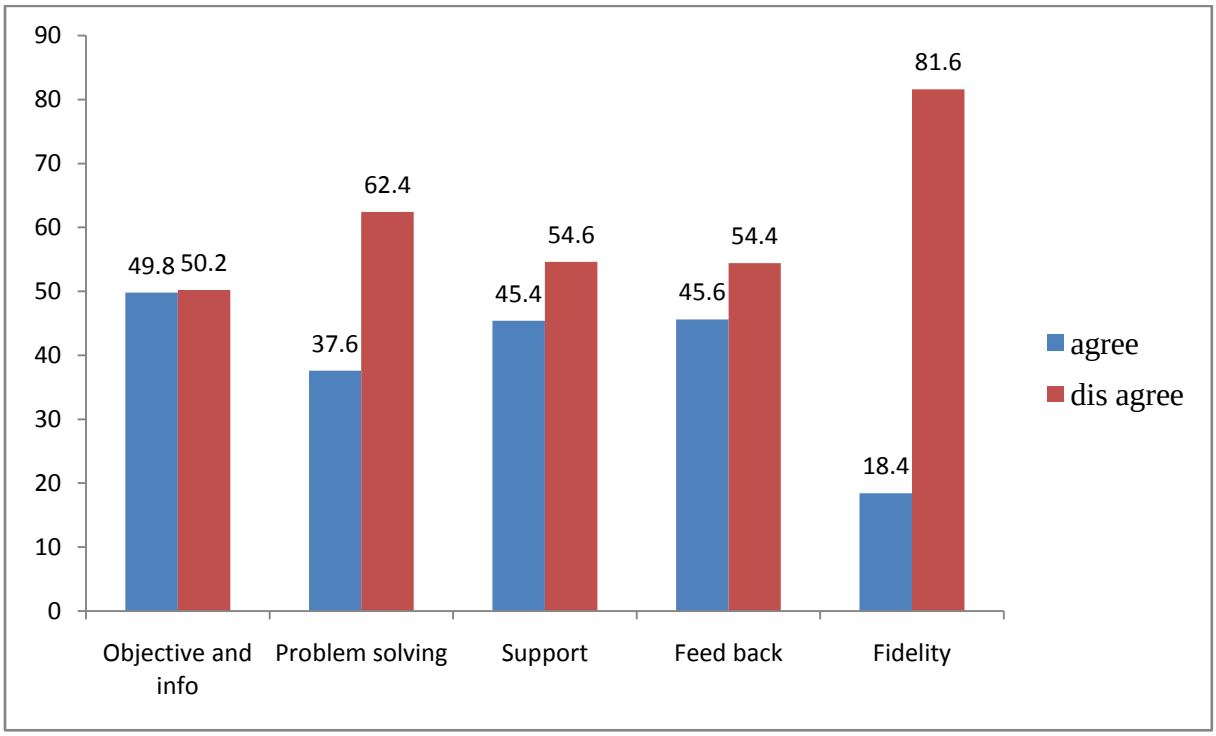

Figure 2: simulation design factors among level- based public health science college students, Amhara , Ethiopia, 2021.

Organizational related factors

Among study participants 118(28.6%) and 108(26.2%) perceived lack of skill lab environment conduciveness and resource respectively. More than half of participants 263(63.8%) perceived more than 20 students in skill lab room present in one session and 244(59.2%) students perceived lack of skill lab adequate

space. Additionally with facilitators competency 152(36.9%) and curriculum integration 144(35%) students were dissatisfied respectively.

Table 3:Organizational related factors among level -based public health science college students, Amhara , Ethiopia, 2021.

Organizational related variables	Category	Frequency (N)	Percentage (%)
Skill-lab environment conduciveness	Yes	294	71.4
	No	118	28.6
Adequacy of resource	Yes	304	73.8
	No	108	26.2
No of students in skill lab>20	Yes	263	63.8
	No	149	36.2
Space adequacy	Yes	168	40.8
	No	244	59.2
Facilitator competency	Yes	260	63.1
	No	152	36.9
Integrated curriculum	Yes	268	65.0
	No	144	35
Total		412	100

Students' satisfaction with simulation- based learning

In this study proportion of students' satisfaction with simulation- based learning was found to be 45.6% with (95%CI: 0.40-0.50).

Factors associated with students' satisfaction with simulation-based learning

Sex of participant, level of education, active learning, collaboration, problem solving, objective, support, feedback, fidelity, simulation environment, space, resource, number of students, facilitator and curriculum were factors significantly associated to students' satisfaction with SBL in bi-variable logistic regression analysis. As well as Active learning, objective and information, collaboration and problem solving were factors significantly associated to satisfaction with SBL in multivariable logistic regression analysis.

The study finding indicated that those students who agreed with active learning were 3 times (AOR =2.905, 95% CI=1.686-5.006, P<0.001) more likely satisfied with simulation based learning than students disagreed with active learning . Students who worked with their peers collaboratively were 2 times (AOR=2.090, 95%CI=1.173-3.725, P < 0.012) more likely satisfied with SBL than students worked alone. Those students who perceived objective and information were 2 times more likely satisfied with SBL (AOR=2.246,95%CI=1.306-3.862, P<0.003).Students who agreed with problem solving were 3 times (AOR=2.648, 95%CI=1.472-4.763, P<0.001) more likely satisfied with SBL than students perceived disagree scored.

Table 4: Bi variable and Multivariable logistic regression of the factors associated with satisfaction related to simulation-based learning among level-based public health science college students, Amhara , Ethiopia, 2021

Variables	Categorized Variables	Level of satisfaction				
		Satisfied	Dis-Satisfied	COR (95%CI)	AOR (95% CI)	P-value
Sex	Male	82	119	1.5(0.99-2.2)	1.2(0.73-1.98)	0.48
	Female	106	105	Ref	Ref	
Level of education	Level III	37	55	1.9(0.6-5.7)	1.8(0.41-7.65)	0.45
	Level IV	146	155	2.6(0.9-7.5)	3.2(0.80-13.10)	0.10
	Level V	5	14	Ref	Ref	
Active learning	Agree	136	57	7.7(4.9-11.9)	2.9(1.68-5.00)	**0.000****
	Disagree	52	167	Ref	Ref	
Environment	Yes	151	143	2.3(1.5-3.6)	1.6(0.89-2.97)	0.108
	No	37	81	Ref	Ref	
Fidelity	Agree	57	19	4.5(2.7-8.2)	1.8(0.90-3.45)	0.097

	dis agree	131	205			
Collaboration	Agree	87	36	4.5(2.9-7.1)	2.09(1.17-3.72)	**0.012****
	Disagree	101	188	Ref	Ref	
Curriculum	Yes	145	123	2.8(1.8-4.3)	1.4(0.77-2.46)	0.280
	No	43	101	Ref	Ref	
Facilitator	Yes	137	123	2.2(1.5-3.3)	1.2(0.66-2.12)	0.556
	No	51	101	Ref	Ref	
Resource	Yes	155	149	2.4(1.5-3.8)	1.1(0.55-2.01)	0.867
	No	33	75	Ref	Ref	
Feed back	Agree	116	72	3.4(2.3-5.1)	1.1(0.64-1.91)	0.714
	Disagree	72	152	Ref	Ref	
Support	Agree	116	71	3.5(2.3-5.2)	1.0(0.59-1.82)	0.886
	dis agree	72	153	Ref	Ref	
No of student	<=20	57	92	0.6(0.4-0.9)	1.4(0.79-2.37)	0.249
	>20	131	132	Ref	Ref	
Adequate Space	Yes	93	75	1.9(1.3-2.9)	1.1(0.64-1.81)	0.761
	No	95	149	Ref	Ref	
Objective	Agree	137	68	6.2(4.0-9.5)	2.25(1.30-3.86)	**0.003****
	Dis agree	51	156	Ref	Ref	
Problem-solving	Agree	115	40	7.2(4.6-11.4)	2.65(1.47-4.76)	**0.001****
	Dis agree	73	184	Ref	Ref	

Ref: reference P-value <0.05 statistically significant

IV. Discussion

In this study proportion of students' satisfaction with simulation based learning was 45.6% (95% CI: 0.40-0.50). This result is congruent with the study carried out in Egypt, 46.3% students' level of satisfaction(43). On the other hand, it is lower than studies conducted in Gondar(31) and Harar, Dire Dawa university(32) in which the proportion of satisfaction with SBL was 54.2% and 70.98% respectively. This difference might be due to level of education and number of students in simulation laboratory room . This result also incongruent with studies in Egypt (59%)(44) ,Saudi Arabia (85%)(35) and Palestine (80.7%) (45).This variation could be due to dissimilarity of technology advancement (standardized patient simulation), For example, evidence showed that use of standardized patient simulation enhanced student satisfaction with their learning (46).

This study showed that students' active learning was statistically significant association with satisfaction of simulation based learning. Students' with active learning perceived agree scored were 2.9 times (AOR =2.9, 95% CI=1.7-5.0) more likely satisfied with simulation based learning than perceived dis agree scored with active learning. This finding is in line with study conducted in Australia(47), USA(5) , Saudi Arabia(48).and also similar study done in Norway(49) .In contrast , the study conducted in Egypt(44) stated students' perceived active learning less value scored among education practice sub variables. This might be due to covid-19 pandemic stress full condition who engaged simulation in their home virtually and had no interaction with their teachers.

According to this study collaborationwas statistically significant association with satisfaction of simulation based learning.Students' who worked with their peers collaboratively were 2.09 times (AOR=2.09, 95%CI=1.17-3.73) more likely satisfied with SBL than who worked alone (no collaboration).This result is congruent with similar studies conducted inAustralia(47), USA(5) and Salem(50).Also similar study done in Korea(51) stated team activity was significantly associated with students' satisfaction .This might be due to the fact that students in simulation lab who demonstrated procedures learn from other comments and doing which increased students' satisfaction with SBL. In contrast to this study a research done in Norway(49) didn't show significant association. This difference might be due to variation of students' exposure and engagement which data collected after 3hour scenario based simulation (computer full body/video) exposure in Norway. But in this study colleges used manikins (human model) type of simulation which encourages working collaboratively in simulation skill lab.

According to this studyproblem solving was significantly associated with satisfaction of simulation based learning. Students' who perceived problem solving were 2.65times (AOR=2.65, 95%CI=1.47-4.76) more likely satisfied with simulation based learning than who perceived dis agree rated problem solving possibilities. This study is consistent with study in USA(5).This could be due to simulation based learning initiated students to solve problems which raise their satisfaction. Also this study is **c**ongruentwith the study done in Singapore (52). Due to the fact, organized simulation-based education incorporated problem-based learning helped tosolve various casesaccording to the study conducted in Finland(53)and Germany(54).However the study carried out in Norway incongruent with this study(49).This difference might be due to methodology and students' socio demographic characteristics.

According to this finding objective and information was significantly associated with satisfaction of SBL.The odds 'of students who perceived agree scored objective and information were 2.25 (AOR=2.25, 95%CI=1.31-3.86) times more likely satisfied than those who did not get information and understand purpose of simulation.This supported with the study conducted in Singapore(52) and china(55).

V. Conclusions

Along with the limitations of the study mentioned above, the overall proportion of students' satisfaction with simulation based learning was low (45.6%) compared to other regions as measured by Jeffers nursing simulation frame work. Presence of Active learning, collaboration, problem solving and clear objectives were factors significantly associated to satisfaction with simulation based learning. In this study number of students in simulation lab was greater than 20 in one session. Even, not associated with students' satisfaction had a great impact on skill lab practice. Finally this study concludes that students' satisfaction with simulation based learning practice needs special consideration. Based on the result of the present study, Regional health bureau, TVET, health science college managers should strengthen simulation based learning practice and struggle to be incorporated in curriculum. Health science college teachers also should strengthen their simulation based education delivery system. Additionally, researchers should conduct qualitative study on simulation based learning practice among under graduate health sciences students to address further organizational related factors with simulation based learning.

Acronym and Abbreviations

AOR=Adjusted Odds Ratio, BDU =Bahir Dar University, CI = Confidence Interval ,COR = Crude odds ratio, FTVET = Federal technical vocational education and training agency , HFS = High Fidelity Simulation = HSC = Health Science College, HICs = High Income Countries, IQR = Inter quartile range, IRB = Institution Review Board, LMIs = Low middle Income Countries, SBL= Simulation Based Learning, SBE= Simulation Based Education, SPSS = statistical package social software, TVET= Technical Vocational Education Training, USA = United States of America

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Acknowledgments

We would like to thank supervisors, data collectors, respondents who participated in this study, and colleagues for their contribution to the accomplishment of this study.

Disclosure

The authors report no conflicts of interest in this work.

References

[1]. Gaba DM. The future vision of simulation in health care. Quality & safety in health care. 2004;13 Suppl 1(Suppl 1):i2-10.
[2]. Brown KM, Paige JT. Simulation in Surgical Training and Practice. Preface. The Surgical clinics of North America. 2015;95(4):xvii-xviii.
[3]. Roh YS, Jang KI. Survey of factors influencing learner engagement with simulation debriefing among nursing students. Nursing & health sciences. 2017;19(4):485-91.
[4]. Kim J, Park J-H, Shin S. Effectiveness of simulation-based nursing education depending on fidelity: a meta-analysis. BMC medical education. 2016;16(1):152.
[5]. Lubbers J, Rossman C. Satisfaction and self-confidence with nursing clinical simulation: Novice learners, medium-fidelity, and community settings. Nurse Education Today. 2017;48:140-4.
[6]. Elshama SS. How to apply Simulation-Based Learning in Medical Education? Iberoamerican Journal of Medicine. 2020;2(2):79-86.
[7]. El Naggar MA, Almaeen AH. Students' perception towards medical-simulation training as a method for clinical teaching. JPMA The Journal of the Pakistan Medical Association. 2020;70(4):618-23.
[8]. Mukarwego B. Midwife lecturers perception on simulation as a Teaching method in the simulation Center: University of Rwanda; 2017.
[9]. Tosterud R. Simulation used as a learning approach in nursing education: Students' experiences and validation of evaluation questionnaires: Karlstads universitet; 2015.
[10]. Kantar RS, Ramly EP, Almas F, Patel KG, Rogers-Vizena CR, Roche NA, et al. Sustainable cleft care through education: the first simulation-based comprehensive workshop in the middle east and North Africa Region. The Cleft Palate-Craniofacial Journal. 2019;56(6):735-43.
[11]. Baptista RCN, Martins JCA, Pereira MFCR, Mazzo A. Students' satisfaction with simulated clinical experiences: validation of an assessment scale. Revista latino-americana de enfermagem. 2014;22:709-15.
[12]. Al Khasawneh E, Arulappan J, Natarajan JR, Raman S, Isac C. Efficacy of Simulation Using NLN/Jeffries Nursing Education Simulation Framework on Satisfaction and Self-Confidence of Undergraduate Nursing Students in a Middle-Eastern Country. SAGE open nursing. 2021;7:23779608211011316.
[13]. Renouf TS, Doyle M, Pollard M, Bankovic T, Dubrowski A. Collaborative development of a simulation-augmented health education program in resource-challenged regions. Cureus. 2018;10(6).
[14]. institute Jrat. CULTIVATING A CULTURE OF SELF-DIRECTED, SIMULATION-BASED LEARNING. 2020.
[15]. Gedlu E, Tadesse A, Cayea D, Doherty M, Bekele A, Mekasha A, et al. INTRODUCTION OF SIMULATION BASED MEDICAL EDUCATION AT ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES: EXPERIENCE AND CHALLENGE. Ethiopian medical journal. 2015:1-8.
[16]. Etanaa NB, Benwu KM, Gebremedhin HG, Desta HB. The effect of simulation-based training in non-physician anesthetists in Tigray region, Ethiopia. BMC research notes. 2020;13:1-5.
[17]. Zhao Y, Hu Y, Liang J, Qian X. A pilot study on the simulation-based training for Ethiopia skilled birth attendants. Nurse Education in Practice. 2019;34:130-8.
[18]. Daneman D, Benatar S. Dynamic tensions following new pedagogy in undergraduate medical education. Academic Medicine. 2019;94(12):1873-7.
[19]. Simper N, Scott J, Frank B, editors. Value Added: Demonstrating Student Skill Development at Your Institution. 14th Annual Conference of the International Society of Scholarship of Teaching and Learning (ISSOTL): REACHING NEW HEIGHTS; 2017.
[20]. Brown JE. Graduate Nurses' Perception of the Effect of Simulation on Reducing the Theory-Practice Gap. SAGE open nursing. 2019;5:2377960819896963.
[21]. Offiah G, Ekpotu LP, Murphy S, Kane D, Gordon A, O'Sullivan M, et al. Evaluation of medical student retention of clinical skills following simulation training. BMC medical education. 2019;19(1):263-.
[22]. Bulamba F, Sendagire C, Kintu A, Hewitt-Smith A, Musana F, Lilaonitkul M, et al. Feasibility of Simulation-Based Medical Education in a Low-Income Country: Challenges and Solutions From a 3-year Pilot Program in Uganda. Simulation in Healthcare. 2019;14(2):113-20.
[23]. Fongang CL, SNAaMBSA. FACTORS THAT IMPEDE OR ENHANCE THE USE OF SIMULATIONS BY NURSE EDUCATORS IN PUBLIC AND PRIVATE INSTITUTIONS OF TRAINING IN CAMEROON. International Journal of Nursing, Midwife and Health Related Cases. 2017;Vol.3, No.3, pp.33-46.
[24]. Bø B, Madangi BP, Ralaitafika H, Ersdal HL, Tjoflåt I. Nursing students' experiences with simulation-based education as a pedagogic method in low-resource settings: A mixed-method study. Journal of clinical nursing. 2021.
[25]. Rule AR, Tabangin M, Cheruiyot D, Mueri P, Kamath-Rayne BD. The call and the challenge of pediatric resuscitation and simulation research in low-resource settings. Simulation in Healthcare. 2017;12(6):402-6.
[26]. 26. Gauger VT, Rooney D, Kovatch KJ, Richey L, Powell A, Berhe H, et al. A multidisciplinary international collaborative implementing low cost, high fidelity 3D printed airway models to enhance Ethiopian anesthesia resident emergency cricothyroidotomy skills. Int J Pediatr Otorhinolaryngol. 2018;114:124-8.
[27]. 27. Yigzaw T, Ayalew F, Kim Y-M, Gelagay M, Dejene D, Gibson H, et al. How well does pre-service education prepare midwives for practice: competence assessment of midwifery students at the point of graduation in Ethiopia. BMC medical education. 2015;15(1):1-10.
[28]. Bifftu BB, Dachew BA, Tadesse Tiruneh B, Mekonnen Kelkay M, Bayu NH. Perceived clinical competence among undergraduate nursing students in the university of Gondar and Bahir Dar university, Northwest Ethiopia: A cross-sectional institution based study. Advances in Nursing. 2016;2016.
[29]. Amsalu B, Fekadu T, Mengesha A, Bayana E. Clinical Practice Competence of Mettu University Nursing Students: A Cross-Sectional Study. Adv Med Educ Pract. 2020;11:791.
[30]. Adem S. NURSING SPECIALITY STUDENTS AND EDUCATORS PERCEPTION AND EXPERIENCE OF SIMULATION BASED LEARNING AT SPHMMC. 2020.
[31]. Gudayu TW, Badi MB, Asaye MM. Self-efficacy, learner satisfaction, and associated factors of simulation based education among midwifery students: A Cross-Sectional Study. Education Research International. 2015;2015.
[32]. Jamie AH, Mohammed AA. Satisfaction with simulation-based education among Bachelor of Midwifery students in public universities and colleges in Harar and Dire Dawa cities, Ethiopia. European journal of midwifery. 2019;3:19.
[33]. Yoo J-H, Kim Y-J. Factors Influencing Nursing Students' Flow Experience during Simulation-Based Learning. Clinical Simulation in Nursing. 2018;24:1-8.

[34]. Aljahany M, Malaekah H, Alzahrani H, Alhamadah F, Dator WL. Simulation-Based Peer-Assisted Learning: Perceptions of Health Science Students. Adv Med Educ Pract. 2021;12:731-7.
[35]. Agha S, Alhamrani AY, Khan MA. Satisfaction of medical students with simulation based learning. Saudi medical journal. 2015;36(6):731-6.
[36]. Tjoflåt I, Koyo SL, Bø B. Simulation-based education as a pedagogic method in nurse education programmes in sub-Saharan Africa – Perspectives from nurse teachers. Nurse Education in Practice. 2021;52:103037.
[37]. Beroz S. A statewide survey of simulation practices using NCSBN simulation guidelines. Clinical Simulation in Nursing. 2017;13(6):270-7.
[38]. Jeffries PR, Rodgers B, Adamson K. NLN Jeffries simulation theory: Brief narrative description. Nursing Education Perspectives. 2015;36(5):292-3.
[39]. colleges Ahs. College annuall reports. 2021.
[40]. Mukaremera MA. Rwandan midwifery students benefits and barriers in the use of simulation based learning regarding neonatal resuscitation: University of Rwanda; 2019.
[41]. http://www.nln.org/professional-development-programs/research/tools-and instruments/descriptions-of-available-instruments. [Internet]. 2016.
[42]. Fikirte Alemayehu AA, Simiret Mersha...etl. Internal Quality Assurance and Improvement Standards for Medical Laboratory Science Program (Levels II–V) First Edition October 2015.
[43]. AE G, AR S, AE H. Effect of Simulation on Maternity Nursing Students' Perception, Satisfaction and Self-Confidence. Egyptian Journal of Health Care. 2018;9(3):14-26.
[44]. Mohamed A, Mohame LK. Perceived Nursing Students' Satisfaction and Self-Confidence towards the Elements of Clinical Simulation Design and Educational Practice during the Outbreak of COVID-19 Pandemic. Tanta Scientific Nursing Journal. 2020;19(2):68-98.
[45]. Salameh BS, Salameh B. Self-confidence and satisfaction among nursing students with the use of high fidelity simulation at Arab American University, Palestine. Sciences. 2017;3(2):15-23.
[46]. Goh Y-S, Selvarajan S, Chng M-L, Tan C-S, Yobas P. Using standardized patients in enhancing undergraduate students' learning experience in mental health nursing. Nurse Education Today. 2016;45:167-72.
[47]. Tutticci N, Coyer F, Lewis PA, Ryan M. High-fidelity simulation: Descriptive analysis of student learning styles. Clinical Simulation in Nursing. 2016;12(11):511-21.
[48]. Kaliyaperumal R, Raman V, Kannan LS, Ali MD. Satisfaction and self-confidence of nursing students with simulation teaching. Int J Health Sci Res. 2021;11(2):44-50.
[49]. Olaussen C, Heggdal K, Tvedt CR. Elements in scenario-based simulation associated with nursing students' self-confidence and satisfaction: A cross-sectional study. Nursing open. 2020;7(1):170-9.
[50]. Zapko KA, Ferranto MLG, Blasiman R, Shelestak D. Evaluating best educational practices, student satisfaction, and self-confidence in simulation: A descriptive study. Nurse Education Today. 2018;60:28-34.
[51]. Roh YS, Lee SJ, Mennenga H. Factors influencing learner satisfaction with team-based learning among nursing students. Nursing & health sciences. 2014;16(4):490-7.
[52]. Tan SHX, Ansari A, Ali NMI, Yap AU. Simulation design and students' satisfaction with home-based simulation learning in oral health therapy. Journal of dental education. 2021.
[53]. Keskitalo T, Kangas M, Ruokamo H, editors. Best of Finland: Adult Playfulness in Simulation-based Healthcare Education. EdMedia+ Innovate Learning; 2018: Association for the Advancement of Computing in Education (AACE).
[54]. Chernikova O, Heitzmann N, Stadler M, Holzberger D, Seidel T, Fischer F. Simulation-based learning in higher education: A meta-analysis. Review of Educational Research. 2020;90(4):499-541.
[55]. Zhu F-F, Wu L-R. The effectiveness of a high-fidelity teaching simulation based on an NLN/Jeffries simulation in the nursing education theoretical framework and its influencing factors. Chinese Nursing Research. 2016;3(3):129-32.

Alebachew Abat, et. al. "Satisfaction with Simulation-based Learning and Associated Factors among Public Health Science College Students in Amhara region, Ethiopia, 2021." *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 12(1), 2023, pp. 31-40.