EVALUATING STUDENTS' PERSPECTIVES ON THE ROLE OF MHEALTH IN ENHANCING CLINICAL STUDY EXPERIENCES. A CASE STUDY OF COLLEGE OF HEALTH SCIENCES AND TECHNOLOGY, IJERO-EKITI

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Abstract
This paper investigated the perceptions of students regarding the function of mobile health (mHealth) technologies in augmenting clinical study experiences among final year students within selected medical related disciplines. A descriptive research of the cross-sectional design was adopted for the study. A sample size of 250 students were selected through a multi-stage sampling procedure. The Departments of Community Health Extension Workers, Paramedicine, and Medical Laboratory Technology were considered in the study. Data were gathered through a structured questionnaire that encompassed dimensions of awareness, utilization, perceived impact, and challenges associated with mHealth. Findings derived from descriptive statistical analysis (frequencies, percentages, mean scores) indicated that while students demonstrated a moderate level of awareness regarding mHealth tools, the extent of their utilization was constrained. Students perceived mHealth tools as having a moderate impact on their clinical learning experiences, while simultaneously reporting considerable challenges, such as poor internet connectivity, insufficient technical support, and restricted access to pertinent applications. The study concludes by asserting that, despite students' awareness of the advantages offered by mHealth in clinical education, the practical integration of these technologies remains constrained. It advocates for enhanced institutional support, the provision of digital literacy training, the improvement of infrastructural capabilities, and the development of policy-driven integration strategies for mHealth technologies within medical education to effectively bridge the disparity between awareness and practical utilization.

Keywords: mHealth, Health Mobile Applications, Clinical Studies.

Introduction

Clinical studies represent a critical aspect of education and can be considered the most sensitive of all (He et al., 2024). This field directly involves human life, which is irreplaceable, and for this reason, medical students, educators, and practitioners are acutely aware of the responsibility it entails (Istepanian & Lacal, 2023). They consequently adopt extra caution in the teaching, learning, and practice of the profession (Jabali et al., 2019).

Unlike the social sciences and education where scholars study human behavior and its interaction with natural phenomena, medical sciences deal directly with human and animal lives, which are held in much higher regard (Izquierdo-Condoy et al., 2024). It is therefore not surprising that clinical research demands a 99% confidence level, allowing for only a 1% margin of error, compared to the 95% confidence level (with 5% error) typically accepted in the social sciences and education (Izquierdo-Condoy et al., 2024).

Clinical studies are approximately 95% practical in nature. These practical components often involve working directly with human or animal subjects to understand the intricacies of clinical procedures. The extent of this practical exposure varies across different fields and levels of medical education, such as medicine, nursing, community health extension training, pharmacy, and pharmacy technician programs (Latif et al., 2019). For instance, medical students are expected to gain more hands on experience than nursing students or community health extension workers in training. The degree of real-time practical exposure greatly influences the competency of students (Lawal et al., 2025). Lee et al., (2023) emphasized in their studies on clinical practice that the competence of medical practitioners is closely tied to the depth of practical experience acquired during training.

In discussing clinical education, it is worth noting that many health institutions in Africa still rely heavily on textbooks, practical manuals, and mannequins for practical sessions (Adebayo et al., 2021). Adeleke (2021) observed that not only is this approach outdated, but many students have little or no access to these mannequins for meaningful practice. Additionally, Adeloye et al., (2019) noted that several institutions fail to maintain the standard lecturer-to-student ratio of 1:15. As a result, many students receive minimal attention during practical sessions and leave without grasping the essential skills (Akinola et al., 2021). Alarmingly, most practical sessions are held only once, and students are not given the opportunity to revisit or reflect on them (Adeleke, 2021).

These traditional methods of training are rapidly becoming obsolete in advanced countries (Chukwu et al., 2020). In more developed settings, the advent of Mobile Health (mHealth) and Virtual Reality (VR) has revolutionized clinical education (Vadivoo et al., 2024). mHealth involves the use of mobile phones, tablets, or smart devices equipped with health applications to facilitate the learning of clinical practices (Teferi et al., 2023). Through these applications, students can access simulations, tutorials, and instructional content to enhance their understanding of complex medical procedures (Sharma et al., 2019).

Some commonly used mHealth applications include Medscape, UpToDate, Figure 1, and OSCE Trainer. Medscape is particularly beneficial for doctors and pharmacists, as it provides continuous access to updated medical information and comprehensive drug references (Singh et al., 2021). UpToDate aids clinical decision-making by offering evidence-based resources that help practitioners avoid diagnostic errors. It enhances learning by providing real-time, evidence-based analyses and practical insights into challenging clinical concepts. OSCE Trainer stands out by offering in-depth video tutorials on various medical procedures (Singh et al., 2021). Remarkably, this application presents numerous real-life clinical sessions where procedures are demonstrated step-by-step. Teferi et al., (2023) highlighted how students are actively engaged as they follow these sessions, fostering a deeper understanding of clinical operations.

The benefits of mHealth, as revealed by (Sadler et al., 2021), extend beyond mere convenience. Students can rewatch practical sessions multiple times until they have mastered the concepts. They also have the opportunity to practice alongside the video demonstrations, which helps minimize errors (Sadler et al., 2021). While some institutions lack access to the sophisticated equipment required for live practical sessions, mHealth bridges this gap by providing high-quality video content featuring up-to-date equipment and techniques.

(Sheikhtaheri & Taheri, 2022) noted that mHealth emerged around 2008, following the launch of the iPhone in 2007 and the App Store in 2008. It gained traction in advanced countries around 2010, beginning with applications like Epocrates, one of the first health apps used for drug references (Oyeyemi et al., 2023). In a personal interaction with students from the School of Nursing at Ekiti State University Teaching Hospital, I discovered that many were either unaware of or had never used these applications. This highlights a significant lag in the adoption of modern learning technologies, despite the widespread ownership of smartphones and tablets among students. At the College of Health Sciences and Technology in Ijero-Ekiti, especially within the departments of Community Health Extension, Medical Laboratory Technology, Pharmacy, and Paramedicine, students are often encouraged to utilize these applications for learning. However, the actual level of compliance remains uncertain. The challenge may not stem solely from the students' willingness but could also involve infrastructural and socioeconomic bottlenecks. As pointed out by Sheikhtaheri & Taheri (2022), these include erratic power supply, the high cost of internet data, the affordability of smartphones, and subscription fees for premium apps. Additionally, the presence of uncertified apps may pose the risk of misinformation.

The domain of clinical research is currently undergoing a significant transformation catalyzed by the integration of mobile health (mHealth) technologies. Through the extensive capabilities of smartphones, wearable sensors, interconnected devices, and wireless communication networks, mHealth is shifting traditional, clinic-centered and episodic research paradigms toward more dynamic, continuous, and patient-centered methodologies (WHO, 2011; Istepanian & Lacal, 2023). This shift affects the entire clinical study lifecycle, with the potential to enhance research efficiency, inclusivity, and outcome accuracy (He et al., 2024; Golenhofen et al., 2020).

A key aspect of this transformation is the modernization of data collection and patient monitoring methods. mHealth enables the continuous gathering of real-world data (RWD) from patients in natural environments, eliminating the reliance on sporadic clinic visits and self-reported data (Lee et al., 2023; Oyeyemi et al., 2023). Wearable technologies and smartphone apps track physical activity, sleep, heart rate variability, and biometric indicators such as glucose levels, creating richer datasets for clinical insights (Kraushaar & Bohnet-Joschko, 2023; Chukwu, Garg & Eze, 2020).

mHealth expands the reach of clinical research to populations historically excluded due to geographic, socioeconomic, or logistical barriers (Olaleye et al., 2023; Adebayo et al., 2021). In Nigeria and other LMICs, mobile platforms are increasingly deployed to overcome infrastructural deficits in healthcare and research, offering access to remote communities through user-friendly mobile applications (Bello et al., 2020; Babatunde et al., 2021).

Another prominent application of mHealth in clinical studies is real-time intervention and adherence support. For instance, mobile apps and SMS-based tools deliver reminders, educational messages, and behavioral prompts that improve participant engagement and adherence to research protocols (Salam et al., 2021; Sadler et al., 2021). This is particularly beneficial in longitudinal studies where retention is critical (Vadivoo et al., 2024; Martínez, Tobar & Taramasco, 2017).

Educational interventions supported by mHealth are further reshaping clinical education and training. Medical students, health professionals, and researchers increasingly use smartphone applications

for real-time learning and patient case simulations (Singh et al., 2021; Golenhofen et al., 2020; Franchi, Magudia & Rasheed, 2020). These technologies promote self-directed learning and clinical readiness (Mudgal et al., 2022; Izquierdo-Condoy et al., 2024), while also fostering digital health literacy critical for future clinical research settings (Machleid et al., 2020; Obasola & Mabawonku, 2021).

Despite these benefits, significant challenges persist. Data privacy, regulatory limitations, inadequate infrastructure, and digital health literacy gaps remain key obstacles to full integration in many LMICs (Oyeyemi et al., 2021; Adebayo et al., 2021; Oluwasanu et al., 2022). Cultural relevance and user acceptability also determine the success or failure of mHealth initiatives (Adebayo et al., 2022). Moreover, the quality and reliability of user-generated health data continue to raise concerns about standardization and validity in clinical trials (Maudsley et al., 2021).

Nonetheless, the revolution of mHealth in clinical research is accelerating. If properly regulated, culturally adapted, and equitably deployed, mHealth stands poised to democratize clinical trials, empower patients, and generate more actionable, context-aware medical insights (Latif et al., 2019; Sharma et al., 2019; Teferi et al., 2023). This marks a pivotal advancement not only in the conduct of research but also in the future of healthcare delivery across diverse global settings.

The emergence of mobile health (mHealth) tools has profoundly altered the landscape of clinical education, particularly for medical and nursing students worldwide. These applications predominantly utilized through smartphones and tablets offer a multitude of functionalities that facilitate learning, support clinical decision-making, and augment practical training experiences (Golenhofen et al., 2020; Singh et al., 2021). In environments such as Nigeria, where conventional resources may be outdated or insufficient, mHealth tools serve as pragmatic, accessible, and interactive substitutes that enhance clinical competencies and address educational deficiencies (Obasola & Mabawonku, 2021; Adebayo et al., 2021).

One of the principal classifications of mHealth tools includes drug reference applications, which provide immediate access to pharmacological data. Applications such as Epocrates, Drugs.com, and Medscape present extensive databases detailing drug indications, contraindications, adverse effects, and dosage guidelines. These resources are especially beneficial during ward rounds or clinical case discussions, where students need to rapidly retrieve drug-related information to support diagnostic and therapeutic decision-making (Mudgal et al., 2022; Chukwu, Garg & Eze, 2020). Equally significant are applications that offer medical dictionaries and terminology resources. Platforms such as Taber's Medical Dictionary help students grasp complex clinical terminology and abbreviations, facilitating the interpretation of case notes, engagement in clinical discourse, and effective self-study (Singh et al., 2021). These tools function as digital glossaries, particularly advantageous for early-stage students adjusting to the medical lexicon.

Applications like BMJ Best Practice, UpToDate, and WHO Clinical Guidelines deliver evidence-based recommendations concerning disease management, diagnostic pathways, and therapeutic interventions. These platforms expose students to international standards and help internalize structured approaches to patient care, especially in resource-limited settings lacking access to current physical libraries or textbooks (WHO, 2011; Oyeyemi et al., 2021). Another critical category consists of medical calculators such as MDCalc and Calculate

by QxMD, which enable precise computations of BMI, drug dosages, creatinine clearance, and IV fluid requirements. These tools bolster students' confidence and accuracy in clinical reasoning and pharmacological calculations (Golenhofen et al., 2020; Vadivoo et al., 2024).

Diagnostic support and symptom assessment are advanced by platforms like VisualDX and Isabel, which use symptom-based algorithms and visual libraries to help users correlate clinical signs with possible diagnoses. These tools enhance students' analytical skills and diagnostic acumen, especially when used during simulation-based education or problem-based learning exercises (Latif et al., 2019; Franchi, Magudia & Rasheed, 2020).

To build hands-on skills, clinical simulation and OSCE (Objective Structured Clinical Examination) apps like OSCE Trainer, Geeky Medics, and Resuscitation! simulate real-world clinical encounters. These tools allow students to practice physical examinations, communication techniques, and emergency protocols in a risk-free digital environment (Martínez, Tobar & Taramasco, 2017; Sadler et al., 2021). For knowledge retention, spaced repetition and active recall tools such as Anki and Quizlet are widely used. These applications support memorization through interactive flashcards and quizzes, especially useful during examination preparation and review of voluminous content (Mudgal et al., 2022; Golenhofen et al., 2020).

Beyond individual learning, mHealth tools facilitate clinical data collection and research. In advanced academic settings, applications are employed for electronic Patient-Reported Outcomes (ePROs), Clinical Outcome Assessments (eCOAs), and digital symptom tracking features that allow students participating in research to gather real-world data efficiently (He et al., 2024; Kraushaar & Bohnet-Joschko, 2023). Tools for medication adherence tracking, electronic diaries, and mobile surveys enable students to see how digital data contributes to both patient care and scientific inquiry (Teferi et al., 2023). Telemedicine and virtual consultation platforms are often integrated with educational apps, enabling students to simulate or observe virtual clinical interactions. Through video consultations, secure messaging, and electronic consent (eConsent) processes, students gain familiarity with digital patient engagement strategies preparing them for evolving models of healthcare delivery (Adebayo et al., 2022; Oluwasanu et al., 2022).

Jabali et al. (2019) investigated faculty members' use and perception of smartphones as educational tools in two Palestinian universities. Using a structured online questionnaire, the study revealed that medical faculty members possessed moderate proficiency in smartphone usage (mean score of 3.18) and held positive attitudes toward incorporating smartphones into their teaching (mean attitude score of 3.60). There were no statistically significant differences in usage or attitude based on gender, academic rank, university, or department affiliation. The researchers concluded that smartphones are seen as a promising tool in medical education by faculty, although their integration remained largely voluntary and informal.

Singh et al. (2021) conducted a survey among first and second year preclinical medical students at the University of the West Indies, Barbados, examining smartphone ownership, app usage, and attitudes. Although only 43% initially considered educational use when acquiring smartphones, 92% ultimately used them for academic purposes particularly for anatomy learning. Students found smartphones beneficial to their education (89.1%) and recommended further integration into university policy

and infrastructure, showing that students embrace smartphones as effective learning aids.

Sheikhtaheri and Moghaddam (2022) surveyed medical and nursing students in Iran to identify the challenges and facilitators of smartphone use. Students reported barriers such as poor internet connectivity, inadequate technical support, and a lack of localized, high-quality applications. On the other hand, key facilitators included institutional support, localized app development, and recommendations by educators. These findings underscored the need for infrastructural and pedagogical support to maximize the value of smartphones in medical training.

Teferi et al. (2023) conducted a cross-sectional study in Ethiopia to determine mobile health (mHealth) app usage among health science students. More than half (59%) of students had installed and used health-related apps, with frequent use among 38.6% of them. Factors such as perceived ease of use, trust, and digital skill levels were significantly associated with higher app utilization. Barriers included lack of awareness, limited time, and insufficient information about app benefits.

Similarly, Sadler et al. (2021) evaluated the impact of the CAPSULE app on medical student performance in the UK. They found a positive correlation between higher app usage and stronger academic performance in internal assessments. Students who completed more case studies within the app tended to score higher and ranked in stronger academic performance, supporting the use of targeted apps to enhance performance.

Martínez et al. (2017) implemented a randomized controlled trial in Chile to test whether a custom app could improve medical students' performance on multiple-choice exams. Students who used the app had significantly greater score improvements compared to controls. The study provided quantitative evidence that structured app-based learning could positively affect academic outcomes.

In Latin America, Izquierdo-Condoy et al. (2024) surveyed 1,590 medical students across seven countries. Most students (88.2%) used smartphones for academic purposes, particularly to watch instructional videos. Clinical-year and senior students were significantly more likely to use phones for academic tasks. The study found disparities in smartphone use based on university type, with private university students reporting more frequent academic usage, indicating that institutional context influences mobile learning adoption.

Vadivoo et al. (2024) also assessed smartphone application usage among Indian medical interns and final-year students. The KAP (Knowledge, Attitude, Practice) survey revealed widespread use of medical apps for self-directed learning. Students valued these tools for quick reference and revision during internships. However, app awareness and availability varied, indicating a need for structured guidance in app integration.

Despite these obstacles, mHealth has proven to be both efficient and supportive in enhancing medical education. However, the key benefits of mHealth in clinical studies which include hands-on skill practice, exam preparation, access to drug information and dosage calculators, flashcards for revision, and diagnostic training through videos and images, present a compelling case for the adoption of mHealth, urging medical and health science students to embrace this innovation despite the challenges.

In light of this, the present study aims to assess students' perspectives on the role of mHealth in enriching clinical study experiences.

Objective of the Study

The main objective of this study is to evaluate students' perspectives on the role of mHealth in enhancing clinical study experiences. Specifically, the study

- determine the level of awareness of mHealth among students.
- investigate the extent of mHealth usage by students.
- examine students' perceptions of the impact of mHealth tools on their clinical learning.
- identify the limitations associated with using mHealth in clinical education.

Research Questions

The following research questions were raised in this study

- What is the level of awareness of mHealth among students?
- To what extent do students use mHealth tools?
- What is the nature of the perceived impact of mHealth tools on clinical learning?
- What are the challenges associated with using mHealth in clinical education, as experienced by students?

Methodology

This study employed a descriptive cross-sectional approach to evaluate student perspectives on the role of mHealth in enhancing clinical study experiences. The descriptive research design was necessary to capture every segment of the population defined for the study, ensuring that the sample used would be a good representation of the population. The cross-sectional design was adopted to allow students from various departments involved in major medical practices to participate and be cross-examined.

The population for the study comprised 526 final-year students from the following departments: Community Health Extension Workers (230 students), Paramedicine (74 students), and Medical Laboratory Technician (222 students). A sample of 250 students was selected for the study using proportional random sampling techniques, with 109, 35, and 106 students chosen from the Departments of Community Health Extension Workers, Paramedicine, and Medical Laboratory Technician, respectively. The derived number of students from each department was then selected using simple random sampling techniques, making the entire process a multi-stage sampling procedure.

A structured questionnaire titled **"Questionnaire on mHealth Use in Enhancing Clinical Learning Among Students"** was used. The questionnaire consisted of five sections focusing on student biodata, awareness of mHealth, use of mHealth tools, perceived impact of mHealth tools on clinical learning, and challenges associated with the use of mHealth in clinical education presented as Sections A, B, C, D, and E, respectively. Section A elicited personal information about the students, including age, sex, and types of gadgets used. Sections B, C, D, and E each contained 10 items measured on a 4-point Likert scale: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1).

The validity of the questionnaire was ensured through content validity, confirming that the items accurately measured the subject matter. Divergent validity was established by administering the questionnaire to 20 students from the Department of Economics at the Federal University Oye and 20 students from the Department of Community Health Extension Workers at FABOTAS College. Their differing scores were correlated, yielding a coefficient value of -0.82.

Reliability was also ensured using the split-half method. The scores of the odd-numbered items were separated from those of the even-numbered items in the responses of the 20 Community Health Extension Worker students at FABOTAS.

The correlation of these two sets of scores yielded a split-half reliability value of 0.71 ($r_{1/2}$). The full reliability coefficient was calculated using the Spearman-Brown prophecy formula, which resulted in a reliability value of 0.83. All research questions were subjected to descriptive analysis using simple percentages, frequencies, and means.

Results

Research Question 1: What is the level of awareness of mHealth among students?

Table 1. Frequency and percentages on the Awareness of mHealth Among Students

S/N	Question Item	Strongly Disagree N (%)	Disagree N (%)	Agree N (%)	Strongly Agree N (%)	Mean
1	I have heard of the term "mHealth" before.	20 (8%)	45 (18%)	110 (44%)	75 (30%)	2.96
2	I understand what mHealth means.	25 (10%)	50 (20%)	115 (46%)	60 (24%)	2.84
3	I know examples of mHealth applications.	28 (11.2%)	55 (22%)	110 (44%)	57 (22.8%)	2.78
4	I have received some form of orientation or awareness on mHealth tools.	35 (14%)	60 (24%)	100 (40%)	55 (22%)	2.70
5	I can differentiate mHealth apps from general health apps.	40 (16%)	62 (24.8%)	95 (38%)	53 (21.2%)	2.64
6	I am aware that mHealth can be used in clinical training.	30 (12%)	58 (23.2%)	105 (42%)	57 (22.8%)	2.76
7	I am aware of institutional support for mHealth learning tools.	38 (15.2%)	64 (25.6%)	98 (39.2%)	50 (20%)	2.64
8	I know students in other institutions use mHealth tools.	30 (12%)	55 (22%)	110 (44%)	55 (22%)	2.76
9	I am aware of mobile apps that support diagnosis and treatment.	25 (10%)	50 (20%)	115 (46%)	60 (24%)	2.84
10	I know that mHealth is encouraged in some parts of the world.	22 (8.8%)	48 (19.2%)	118 (47.2%)	62 (24.8%)	2.88

The data in Table 1 shows that students have a moderate level of awareness regarding mHealth. Most items recorded average mean values between 2.64 and 2.96, indicating that while students are not completely uninformed, their awareness is not consistently high either. Approximately 20–25% strongly agreed, while 18–25% disagreed with most items. This suggests that mHealth is known to students at a surface or introductory level, but deeper conceptual understanding and institutional exposure may be lacking.

Research Question 2: To what extent do students use mHealth tools?

Table 2. Frequency and percentages on the Usage of mHealth Tools

S/N	Question Item	Strongly Disagree N (%)	Disagree N (%)	Agree N (%)	Strongly Agree N (%)	Mean
1	I use mHealth tools often in clinical training.	32 (12.8%)	81 (32.4%)	98 (39.2%)	39 (15.6)	2.58
2	I use mobile apps for learning clinical concept and practical.	30 (12%)	84 (33.6%)	100 (40%)	36 (14.4%)	2.57
3	I use mHealth for drug references.	28 (11.2%)	80 (32%)	106 (42.4%)	36 (14.4%)	2.60
4	I consult mHealth apps for disease examinations.	29 (11.6%)	83 (33.2%)	104 (41.6%)	34 (13.6%)	2.57
5	I use mHealth apps to prepare for practical exams.	35 (14%)	86 (34.4%)	97 (38.8%)	32 (12.8%)	2.51
6	I use apps that provide videos and tutorials for clinical procedures.	36 (14.4%)	85 (34%)	100 (40%)	29 (11.6%)	2.49
7	I access online resources through mHealth platforms.	38 (15.2%)	89 (35.6%)	95 (38%)	28 (11.2%)	2.45
8	I use mHealth tools during clinical postings.	40 (16%)	90 (36%)	92 (36.8%)	28 (11.2%)	2.43
9	I have more than one mHealth app on my phone.	42 (16.8%)	87 (34.8%)	95 (38%)	26 (10.4%)	2.42
10	I use mHealth apps when I have doubts about clinical information.	39 (15.6%)	86 (34.4%)	97 (38.8%)	28 (11.2%)	2.46

The data reveals low usage of mHealth tools among students. Most items show that about 33–36% disagreed, while only around 11–15% strongly agreed. Mean scores range from 2.42 to 2.60, which clearly indicates below-average usage. Although students are aware of mHealth, this low engagement may stem from infrastructural challenges or lack of institutional integration. This supports the earlier observation in Table 4 that numerous barriers exist to active utilization.

Research Question 3: What is the nature of the perceived impact of mHealth tools on clinical learning?

Table 3. Frequency and percentages on the Perceived Impact of mHealth Tools on Clinical Learning

S/N	Question Item	Strongly Disagree N (%)	Disagree N (%)	Agree N (%)	Strongly Agree N (%)	Mean
1	mHealth has improved my understanding of clinical concepts.	18 (7.2%)	55 (22%)	130 (52%)	47 (18.8%)	2.93
2	Using mHealth tools has enhanced my diagnostic skills.	20 (8%)	60 (24%)	125 (50%)	45 (18%)	2.89
3	I feel more confident during clinical sessions when I use mHealth apps.	22 (8.8%)	65 (26%)	120 (48%)	43 (17.2%)	2.86
4	mHealth apps provide faster access to critical information.	16 (6.4%)	52 (20.8%)	130 (52%)	52 (20.8%)	2.96
5	mHealth has improved the quality of my practical learning.	21 (8.4%)	59 (23.6%)	126 (50.4%)	44 (17.6%)	2.89
6	I retain clinical knowledge better using mHealth resources.	25 (10%)	60 (24%)	120 (48%)	45 (18%)	2.86
7	mHealth tools help me prepare for exams more efficiently.	19 (7.6%)	63 (25.2%)	124 (49.6%)	44 (17.6%)	2.89
8	mHealth allows me to learn at my own pace.	15 (6%)	50 (20%)	132 (52.8%)	53 (21.2%)	2.99
9	mHealth enhances collaborative learning with peers.	23 (9.2%)	60 (24%)	127 (50.8%)	40 (16%)	2.86
10	mHealth makes clinical learning more engaging.	20 (8%)	58 (23.2%)	128 (51.2%)	44 (17.6%)	2.90

The findings show that most students moderately agree on the positive impact of mHealth tools on clinical learning. Between 48% and 53% of the students agreed across most items, and about 17–21% strongly agreed. The mean scores range from 2.86 to 2.99**,** which reflects a fair level of impact. This suggests that while students appreciate the value of mHealth tools in areas such as understanding clinical concepts, improving exam readiness, and encouraging self-paced learning, the impact is not overwhelmingly high. This could be attributed to usage limitations or barriers to optimal application in clinical settings.

Research Question 4: What are the challenges associated with using mHealth in clinical education, as experienced by students?

Table 4. Frequency and percentages on the Challenges Associated with Using mHealth in Clinical Education

S/N	Question Item	Strongly Disagree N (%)	Disagree N (%)	Agree N (%)	Strongly Agree N (%)	Mean
1	Poor internet access limits my use of mHealth tools.	10 (4%)	20 (8%)	110 (44%)	110 (44%)	3.28
2	Lack of reliable electricity affects my use of mobile tools.	12 (4.8%)	22 (8.8%)	105 (42%)	111 (44.4%)	3.26
3	I cannot afford the data cost required for mHealth usage.	15 (6%)	25 (10%)	102 (40.8%)	108 (43.2%)	3.22
4	mHealth apps are not compatible with my mobile device.	18 (7.2%)	28 (11.2%)	100 (40%)	104 (41.6%)	3.16
5	Most mHealth apps are not culturally or contextually relevant.	20 (8%)	30 (12%)	95 (38%)	105 (42%)	3.14
6	There is a lack of training on using mHealth tools.	14 (5.6%)	26 (10.4%)	108 (43.2%)	102 (40.8%)	3.19
7	I'm not digitally skilled to use mHealth tools effectively.	17 (6.8%)	30 (12%)	100 (40%)	103 (41.2%)	3.15
8	I feel mHealth affects patient confidentiality.	21 (8.4%)	32 (12.8%)	95 (38%)	102 (40.8%)	3.11
9	My institution discourages use of mobile phones during clinicals.	22 (8.8%)	30 (12%)	98 (39.2%)	100 (40%)	3.10
10	Most mHealth content is in English, which I struggle with.	19 (7.6%)	30 (12%)	99 (39.6%)	102 (40.8%)	3.14

The responses reveal severe challenges affecting students' ability to effectively use mHealth tools. A significant majority of students (around 40–44%) strongly agreed with most of the challenge items. Mean values range from 3.10 to 3.28**,** indicating high to severe obstacles**,** especially concerning internet access, electricity supply, cost of data, device compatibility, and digital literacy**.** These findings imply that systemic and infrastructural issues**,** alongside a lack of training and institutional restrictions, significantly hinder the successful integration of mHealth into clinical education.

Discussion

Based on the findings of this study on students' awareness, usage, impact perception, and challenges associated with mHealth tools in clinical education, several parallels and contrasts emerge when viewed against the backdrop of existing empirical literature.

The present study reveals that students have moderate awareness of mHealth, as shown by mean values ranging between 2.64 and 2.96. This aligns with Jabali et al. (2019)**,** who reported moderate smartphone proficiency among faculty members, suggesting that both educators and students are familiar with mobile tools but may lack advanced integration into formal teaching and learning. Similarly, Teferi et al. (2023) reported that awareness was a limiting factor for mHealth adoption, reinforcing our finding that awareness remains a key area needing improvement.

Despite the moderate awareness, actual usage of mHealth tools among students in this study was low, as reflected by low mean values (mostly below 2.5). This contrasts with the findings of Singh et al. (2021) and Izquierdo-Condoy et al. (2024), where a significant proportion of students reported using smartphones for academic purposes 92% and 88.2%, respectively. The discrepancy may stem from institutional differences, infrastructure availability, or cultural factors affecting the pace of mHealth integration in clinical education in Nigeria.

The perceived impact of mHealth tools was found to be fair, with mean scores around 2.7 to 2.8. This moderate perception reflects students' recognition of the potential benefits of mHealth in enhancing learning outcomes, though not strongly. This is consistent with Sadler et al. (2021) and Martínez et al. (2017), who demonstrated that structured mHealth interventions (e.g., the CAPSULE app) improved academic performance. However, in our context, the fair perception may indicate a gap between theoretical potential and actual experienced benefits due to underutilization.

The study also uncovered severe challenges in the use of mHealth tools, as evidenced by high mean scores exceeding 3.0 across items in the challenges section. This aligns closely with the findings of Sheikhtaheri and Moghaddam (2022), who highlighted poor connectivity, lack of technical support, and insufficient localized content as major barriers. Similarly, Vadivoo et al. (2024) observed variability in app availability and student awareness, pointing to the need for structured institutional policies and digital infrastructure enhancement.

Conclusion

This study investigated students' perspectives on the role of mobile health (mHealth) technologies in enhancing clinical study experiences, in College of Health Sciences and Technology, Ijero-Ekiti. The findings revealed a moderate level of awareness of mHealth tools among students, yet their actual usage remained low, despite a fair perception of impact. Additionally, students reported facing significant challenges, including poor internet connectivity, lack of technical support, limited access to relevant apps, and insufficient institutional encouragement.

Recommendations

Based on these findings, the study makes the following recommendations:

- Higher education institutions should formally integrate mHealth tools into the clinical curriculum, ensuring students are exposed to structured and relevant applications that support learning, most especially in Ekiti State.
- Regular workshops and orientation programs should be conducted to raise awareness and improve students' digital competencies related to the use of mHealth technologies in Ekiti State.
- Efforts should be made to improve internet access, especially in clinical training locations, and ensure students have access to reliable digital devices and technical support, in Ijero and Ekiti State generally.
- Ekiti State Government and head of institutions should develop policies that support the integration of mobile technologies into medical education, including funding support, partnerships with app developers, and digital literacy initiatives.

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