

## ASSESSMENT OF PERCEPTION AND AWARENESS OF TELEREHABILITATION AMONG MEDICAL AND PHYSIOTHERAPY STUDENTS IN SELECTED UNIVERSITIES OF NORTH-EASTERN NIGERIA

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### Abstract

**Introduction:** Telerehabilitation refers to the use of telecommunication technologies to deliver rehabilitation services remotely, offering a solution to limited access to healthcare in underserved regions.

**Objectives:** This study aimed to assess and compare the levels of awareness and perception of telerehabilitation among medical and physiotherapy students in selected universities in North-Eastern Nigeria.

**Materials and Methods:** A cross-sectional design was employed, involving 274 students in 400-600 academic levels from three universities. Participants were selected using purposive sampling. Data were collected using the Telerehabilitation Adoption in Medical Education Questionnaire, a validated self-administered instrument. One-way ANOVA was used to assess differences in telerehabilitation awareness across the three academic levels (400, 500, and 600), with post-hoc Tukey's HSD tests to identify specific group differences. These comparisons helped determine whether significant differences existed in awareness and perception based on programme, gender, and academic progression.

**Results:** The students of physiotherapy demonstrated significantly higher awareness of telerehabilitation compared to medical students, with a t-value of -4.12 and a p-value less than 0.001, indicating strong statistical significance. Additionally, physiotherapy students reported more favorable perceptions across all measured domains, including knowledge, readiness, and clinical applicability, with p-values less than 0.05 for each comparison. Students at the 600 level showed significantly greater awareness than those in the 400 and 500 levels, as indicated by a one-way ANOVA result ( $F = 9.24$ ,  $p < 0.001$ ), suggesting that awareness increases with academic progression. However, there was no significant difference in perception scores by gender ( $p = 0.471$ ), indicating that both male and female students held similar views regarding telerehabilitation.

**Conclusion:** There is a notable disparity between medical and physiotherapy students regarding awareness, perception, and readiness for telerehabilitation. The study emphasizes the need to incorporate interdisciplinary telerehabilitation training within health professional curricula to better prepare students for future digital healthcare practice in Nigeria.

**Keywords:** Telerehabilitation, Awareness, Perception, Medical Students, Physiotherapy Students, North-Eastern Nigeria.

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## Introduction

Telerehabilitation is an emerging model of healthcare delivery that employs telecommunication technologies to remotely provide rehabilitation services, reducing the necessity for face-to-face consultations.<sup>(1,2)</sup> It has gained international attention for improving access to therapy, particularly in rural and underserved regions where conventional rehabilitation services are limited.<sup>(3,4)</sup> Research indicates that telerehabilitation enhances adherence to therapeutic programmes and improves health outcomes among individuals with chronic conditions.<sup>(5,6)</sup>

Globally, telerehabilitation has increasingly become integrated into healthcare systems, particularly in high-income countries with well-developed digital infrastructures.<sup>(7,8)</sup> The COVID-19 pandemic further accelerated its adoption as clinicians sought safe alternatives to continue care despite restrictions imposed by social distancing.<sup>(3,5)</sup> Additionally, telerehabilitation has been shown to reduce healthcare costs by decreasing hospital visits and removing transportation-related barriers.<sup>(2,8)</sup>

In Nigeria, although physiotherapy services continue to evolve, the adoption of telerehabilitation remains low despite moderate awareness among health professionals.<sup>(9)</sup> Major barriers include limited technological infrastructure, absence of standardised guidelines, and insufficient digital literacy.<sup>(10)</sup> Studies report that only 43% of healthcare practitioners in the country exhibit moderate awareness of telerehabilitation, and even fewer apply it in clinical contexts.<sup>(9)</sup>

In Northern Nigeria, challenges such as weak internet connectivity, insecurity, and widespread poverty further impede digital health initiatives, including

telerehabilitation.<sup>(10)</sup> Among emerging healthcare providers, disparities exist in preparedness for telerehabilitation between medical and physiotherapy students. Physiotherapy students often show higher awareness yet lack hands-on application, whereas medical students, key stakeholders in referral decision-making, frequently have limited exposure to telerehabilitation concepts.<sup>(11)</sup> These gaps may impede coordinated patient care, particularly within North-Eastern Nigeria where resource constraints are most severe.

The study specifically aims to compare the levels of awareness and perceptions of telerehabilitation among medical and physiotherapy students in selected universities in North-Eastern Nigeria. By assessing these variables, the research provides empirical evidence on the current state of knowledge and attitudes toward telerehabilitation within these student groups. The findings directly inform curriculum development by highlighting the need for improved education and training in telerehabilitation for both disciplines, thereby supporting more effective integration of digital healthcare practices in future professional training.

## Materials and Method

A descriptive cross-sectional survey design was used to evaluate students' awareness and perceptions of telerehabilitation. Convenience sampling was applied to recruit participants who were readily accessible and willing to participate. The total eligible student population comprised 866 individuals (Medical students: University of Maiduguri = 434, Yobe State University = 87, Federal University of Health Sciences Azare = 176; Physiotherapy students: University of Maiduguri = 130, Yobe State University = 39). The minimum

sample size of 274 was calculated using Yamane's formula ( $n = N/1 + Ne^2$ ), where N represents the population size and e the margin of error (0.05).<sup>(12)</sup>

Ethical clearance for this study was obtained from the Yobe State University Teaching Hospital Health Research Ethics Committee. Permission was also sought from the relevant authorities at each participating university. All participants provided written informed consent prior to their inclusion in the study, ensuring their voluntary participation and the confidentiality of their responses.

Data were collected using the Telerehabilitation Adoption in Medical Education Questionnaire (TAME-Q), a structured self-administered tool developed by modifying previously validated questionnaires in telehealth-related research.<sup>(13,14,15)</sup> The instrument comprises three sections: Section A covers socio-demographic characteristics; Section B assesses knowledge of telerehabilitation using multiple-choice and ranking items; and Section C evaluates perception and readiness using a five-point Likert scale (Strongly Disagree to Strongly Agree).

Scoring involves assigning points to each Likert-scale response (Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5). The total score for each section is calculated by summing the responses, enabling quantitative analysis of knowledge, perception, and readiness levels. Regarding clinical applicability, the questionnaire's design allows for the assessment of knowledge and readiness for telerehabilitation among medical students, which can inform curriculum development and guide interventions aimed at improving clinical preparedness for telehealth practices. Face and content validation were

conducted by subject experts. An initial pilot test with 20 students yielded a Cronbach's alpha of 0.59; after revision for clarity, a second pilot with another 20 students demonstrated excellent internal consistency ( $\alpha = 0.89$ ).

Data collection occurred over one week. The researcher distributed questionnaires directly at Yobe State University, while trained assistants managed distribution through class representatives at the University of Maiduguri and the Federal University of Health Sciences, Azare. Completion time per questionnaire averaged 15–20 minutes.

Data analysis was conducted using SPSS version 26. Descriptive statistics were used to summarize demographic characteristics and measures of awareness. Independent t-tests were employed to compare mean scores between medical and physiotherapy students, as well as between genders. One-way ANOVA was used to evaluate differences across academic levels, with Tukey's HSD post-hoc test applied for pairwise comparisons. The level of statistical significance was set at  $p < 0.05$ .

The choice to analyze differences by academic level, gender, and professional group (medical vs. physiotherapy) was guided by the primary research objectives, which focused on assessing variations in telerehabilitation awareness and readiness among these specific categories. While factors such as institution, location, and age could influence outcomes, they were not prioritized due to the sample's relative homogeneity (students from the same region and institution) and the study's emphasis on professional and academic variables. If these factors had been more diverse or central to the research question, they would have been included in the analysis.

Parametric tests (t-tests, ANOVA) were selected because the main outcome variables—knowledge and readiness scores—were measured on interval or ratio scales, derived from Likert-type items and summed to create total scores. These data types are generally appropriate for parametric analysis when the sample size is adequate and the distribution is approximately normal, as confirmed by pilot testing and inspection of histograms and skewness/kurtosis values. The Cronbach's alpha values from pilot studies indicated good internal consistency, further supporting the reliability of the scales for parametric analysis.

### Results

A total of 274 students participated in the study. As shown in Table 1, the majority

were aged 22–25 years (57.7%), and male respondents constituted 56.9% of the sample. More than half of the participants were in the 400 level of study (54.7%), followed by the 500 level (34.7%) and 600 level (10.6%). Nearly half of the participants were from the University of Maiduguri (48.2%), with 31.0% from Yobe State University and 20.8% from the Federal University of Health Sciences, Azare. In terms of geographic background, 43.4% were from urban settings, 34.7% from semi-urban, and 21.9% from rural areas. Most participants were enrolled in the Medical (MBBS) programme (70.4%), while 29.6% were Physiotherapy (BPT) students (Figure 1).

**Table 1: Socio-Demographic Characteristics of Participants**

Variable	Category	Frequency (n)	Percentage (%)
<b>Age Group</b>	18–21 years	73	26.6
	22–25 years	158	57.7
	26–30 years	37	13.5
	>30 years	6	2.2
<b>Gender</b>	Male	156	56.9
	Female	116	42.3
	Prefer not to say	2	0.7
<b>Academic Level</b>	400 Level	150	54.7
	500 Level	95	34.7
	600 Level	29	10.6
<b>Institution</b>	University of Maiduguri	132	48.2
	Yobe State University	85	31.0
	Federal University of Health Sciences, Azare	57	20.8
<b>Geographic Background</b>	Urban	119	43.4
	Semi-Urban	95	34.7
	Rural	60	21.9

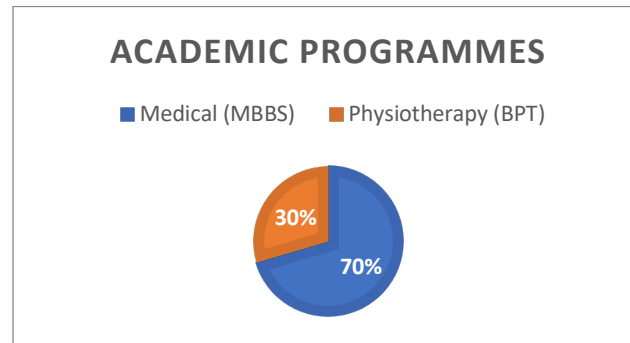


Figure 1: Academic programmes enrolled

### Independent Samples t-Test Comparing Telerehabilitation Perceptions by Programme

An independent samples t-test was conducted to compare telerehabilitation perceptions between medical (MBBS) and physiotherapy (BPT) students across three domains (Table 2): Awareness and Knowledge, Readiness and Intent, and Clinical Applicability.

Medical students recorded significantly lower scores than physiotherapy students across all three scales. For Awareness and

Knowledge, medical students ( $M = 12.15$ ,  $SD = 3.45$ ) scored significantly lower than physiotherapy students ( $M = 13.91$ ,  $SD = 3.12$ ),  $t(272) = -5.01$ ,  $p < .001$ . For Readiness and Intent, medical students ( $M = 16.72$ ,  $SD = 3.89$ ) again scored lower compared to physiotherapy students ( $M = 17.86$ ,  $SD = 3.52$ ),  $t(272) = -2.56$ ,  $p = .011$ . Similarly, for Clinical Applicability, medical students ( $M = 17.16$ ,  $SD = 4.21$ ) scored significantly lower than physiotherapy students ( $M = 19.00$ ,  $SD = 3.79$ ),  $t(272) = -3.87$ ,  $p < .001$ .

Table 2: Independent Samples t-Test Comparing TR Perceptions by Programme

Scale	Programme	Mean (M)	SD	t-value	p-value
Scale 1: Awareness & Knowledge	Medical (n=193)	12.15	3.45	-5.01	< .001*
	Physiotherapy (n=81)	13.91	3.12		
Scale 2: Readiness & Intent	Medical (n=193)	16.72	3.89	-2.56	.011*
	Physiotherapy (n=81)	17.86	3.52		
Scale 3: Clinical Applicability	Medical (n=193)	17.16	4.21	-3.87	< .001*
	Physiotherapy (n=81)	19.00	3.79		

#### Key:

SD = Standard Deviation

n = Sample size

\*Significant at  $p < 0.05$ .

### One-Way ANOVA for Telerehabilitation Awareness by Academic Level

A one-way ANOVA was conducted to compare telerehabilitation awareness across three academic levels (400L, 500L, and 600L) (Table 3a and Table 3b). The analysis revealed a statistically significant difference in awareness scores among the groups,  $F(2, 271) = 9.24$ ,  $p < .001$ , indicating that awareness varies by academic level.

**Table 3a: Between-Groups ANOVA for Telerehabilitation Awareness**

Source	Sum of Square	df	Mean Square	F	p-Value
Between Groups	23.27	2	11.63	9.24	< .001*

**Table 3b: Within-Groups ANOVA for Telerehabilitation Awareness**

Source	Sum of Square	df	Mean Square
Within Groups	341.41	271	1.26

Key:

df = degrees of freedom

F = F-statistic (ratio of between-group variance to within-group variance)

\*Significant at  $p < 0.05$

Post-hoc Tukey HSD analysis revealed that 600L students ( $M = 2.86$ ,  $SD = 1.20$ ) had significantly higher awareness scores than both 400L students ( $M = 2.11$ ,  $SD = 1.09$ ,  $p < .001$ ) and 500L students ( $M = 2.26$ ,  $SD = 1.12$ ,  $p = .014$ ). However, there was no significant difference between 400L and 500L students ( $p = .587$ ).

These findings suggest that telerehabilitation awareness improves with academic progression, with the highest awareness observed among final-year students. Therefore, the null hypothesis was rejected, confirming a significant difference in awareness across academic levels.

### Discussion

The present study revealed a notable disparity in telerehabilitation awareness and perceptions between medical and

To enhance clarity in statistical reporting, the one-way ANOVA results are presented in two distinct tables. Table 3a details the between-groups ANOVA, which captures the variability in awareness scores across the three academic levels. Table 3b presents the within-groups ANOVA, reflecting the variability in awareness scores within each academic level.

physiotherapy students. Physiotherapy students exhibited higher levels of core awareness and more positive perceptions across knowledge, readiness, and clinical applicability domains. This finding aligns with both international and Nigerian studies, which report that physiotherapy education integrates rehabilitation-specific technologies more extensively than medical curricula.<sup>(13,16)</sup> The practical, intervention-oriented nature of physiotherapy training likely facilitates greater familiarity with remote healthcare delivery systems, whereas medical education, with its broader diagnostic and pharmacological focus, may place less emphasis on telerehabilitation.<sup>(17)</sup> This knowledge gap could hinder effective interdisciplinary collaboration, particularly since medical graduates often serve as



primary referral sources but may lack the awareness required to direct patients appropriately to telerehabilitation services provided by physiotherapists.<sup>(18)</sup>

Additionally, a significant positive association was observed between academic level and telerehabilitation awareness. Final-year students (600L) demonstrated higher awareness compared to junior students (400L and 500L), likely reflecting increased engagement in clinical training where telehealth solutions become more relevant.<sup>(19)</sup> This emphasizes clinical education as a critical period for embedding digital health literacy to prepare future healthcare professionals for evolving healthcare delivery models.

The study also found no significant gender differences in telerehabilitation perceptions. This contrasts with some prior reports suggesting gender-based differences in digital health attitudes.<sup>(20)</sup> but may indicate a growing parity in technology acceptance among emerging Nigerian healthcare professionals. Such trends could reflect broader access to digital tools and shared educational experiences that reduce traditional gender-related barriers.<sup>(21)</sup>

Overall, these findings highlight the need to integrate telerehabilitation education early in both medical and physiotherapy curricula. Doing so would enhance interdisciplinary understanding, improve readiness for telehealth delivery, and help bridge the current knowledge gap between healthcare professions.

### Conclusion

Physiotherapy students' demonstrated significantly higher awareness and more positive perceptions of telerehabilitation compared to medical students, highlighting a gap in digital health preparedness between the two programmes. Awareness of

telerehabilitation increased with academic progression, with final-year students showing the highest levels of knowledge and readiness. These findings underscore the need to integrate telerehabilitation education across all levels of medical and physiotherapy curricula to promote interdisciplinary collaboration and optimize future digital healthcare delivery.

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### Authors' Contributions

**AS** and **UL** conceive the idea and supervise the whole study, **SMB** draft the introductory part of the study, collect data and present the result. **NHM** and **IAA** draft methodology and pre proof the study, **MAD** and **HA** draft the discussion and conclusion part of the study. **STM** draft the abstract part of the study. All authors approved the final version of the manuscript

### Conflict of Interest

The authors declare that they have no conflicts of interest concerning the publication of this study.

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### Consent

All participants provided written informed consent prior to their inclusion in this study.

### Ethical Approval

Ethical approval for this study was obtained from the Yobe State University Teaching Hospital Health Research Ethics Committee.

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