A Readiness Utilization Gap in Telemedicine among Adults with Mobility Disabilities in Kakamega and Baringo Counties, Kenya

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ABSTRACT

Background: Telemedicine may reduce travel barriers for people with mobility disabilities, but perceived readiness may not reflect actual use.

Objectives: To compare telemedicine utilization and perceived readiness in Kakamega and Baringo counties and test whether patient, organizational, workforce and infrastructure readiness were associated with utilization.

Methods: We analysed complete questionnaires from adults with mobility disabilities at two county hospitals. Fifty-eight respondents coded as younger than 18 years were excluded, leaving 243 adults. Composite scores were recomputed from item-level responses. County means were compared with Welch tests; associations were assessed using Pearson correlations and multivariable linear regression with HC3 robust standard errors.

Results: Kakamega contributed 137 adults and Baringo 106. Utilization was similar (3.85 vs 3.79; difference -0.06, 95% CI -0.25 to 0.13; p=0.553). Patient readiness was nominally higher and infrastructure capability nominally lower in Baringo, but neither remained significant after Holm correction. No readiness domain correlated with utilization (the largest absolute r was 0.077). The adjusted model had weak fit (R2=0.049; adjusted R2=-0.005; p=0.612), and no readiness or demographic variable was independently associated with utilization.

Conclusions: Patient-reported telemedicine factors, including awareness, willingness, beliefs and perceived accessibility, were not independently associated with telemedicine utilization, and county did not modify readiness-utilization associations. Readiness surveys should be interpreted alongside direct measures of completed telemedicine use and access constraints.

Keywords: telemedicine; disability; mobility limitation; digital health; healthcare access; Kenya

INTRODUCTION

People with disabilities experience persistent barriers to healthcare in low- and middle-income countries, including inaccessible services, transport constraints, information barriers and health-system limitations [1,2]. Recent work on disability-inclusive health systems emphasizes that access depends on the interaction of service design, workforce capability, assistive support and broader system conditions rather than on a single barrier [3]. Mobility disability can make travel to facilities especially burdensome, which creates a plausible role for remote care [4-6].

Telemedicine can extend clinical contact beyond the physical facility and has been associated with convenience and patient satisfaction in many settings [7,8]. Its uptake, however, is uneven. Systematic reviews identify technical reliability, cost, workflow, usability and organizational support as recurrent barriers [9].

Patient acceptance also depends on perceived usefulness, confidence and practical fit with care needs [10,11]. Digital and eHealth literacy influence the capacity to obtain and use digital health information [12], while digital inclusion is increasingly recognised as an equity issue rather than a purely technological one [13].

Telemedicine inequities have been documented across socioeconomic and demographic groups, and the modality used can itself shape access [14-18]. These observations matter for people with mobility disabilities because a service intended to bypass physical barriers may still reproduce digital, financial or organizational barriers.

African digital-health implementation studies describe strong potential but recurrent challenges related to infrastructure, integration, workforce support and sustainability [19-24]. Kenyan physicians have similarly reported that telemedicine is used, but direct-to-patient use remains constrained and often complements in-person care [25]. Implementation research further shows that adoption, routine use and sustainability are distinct stages influenced by multilevel processes [26-29].

Evidence specific to adults with mobility disabilities in rural Kenyan counties remains limited. An additional methodological concern is that studies often treat favourable readiness or acceptance scores as proxies for use. This study therefore examined utilization as a separate outcome. It compared telemedicine utilization and readiness across Kakamega and Baringo counties and tested whether patient readiness, organizational readiness, human-resource capacity and infrastructure capability were associated with utilization. County-by-readiness interactions were explored to determine whether these relationships differed between the two settings.

METHODS

Study design and Participant Sampling

This study reports the quantitative cross-sectional patient component of a study conducted at Kakamega County Hospital and Baringo County Hospital in Kenya. The facilities were selected because telemedicine services were available and the sites served substantial rural populations. A total of 395 patient questionnaires were distributed during the survey. Of these, 301 complete patient records were used in the analysis. In accordance with the study objective and eligibility criteria, which focused on adults, 58 records from participants categorized as being below 18 years of age were excluded. The final analytic sample therefore comprised 243 adults, including 137 participants from Kakamega County and 106 from Baringo County.

Measures

Telemedicine utilization was calculated as the mean of seven utilization items (B1-B7). Patient readiness was calculated from seven patient-factor items (C1-C7) covering awareness, beliefs, willingness and perceived accessibility. Organizational readiness, human-resource capacity and infrastructure capability were calculated from D1-D6, E1-E6 and F1-F5, respectively. Items used five-point response scales. Higher scores indicated more favourable ratings. To preserve row-level correspondence, all composite scores were recomputed directly from the constituent item responses.

Statistical analysis

Participant characteristics are presented as n (%). Internal consistency was estimated using Cronbach alpha. County differences in characteristics used chi-square tests, and continuous scale means were compared using Welch independent-samples tests with 95% confidence intervals. Because five scale comparisons were performed, Holm-adjusted results were checked as a multiplicity sensitivity analysis. Pearson correlations quantified bivariate associations with utilization, with Fisher-transformed 95% confidence intervals; Spearman correlations were also examined as a sensitivity check and did not change the conclusions. A multivariable ordinary least-squares model included the four readiness domains, county, sex, age category and education. HC3 heteroscedasticity-robust standard errors were used because the utilization score showed non-normal residuals. Multicollinearity was low (maximum variance inflation factor 1.48). Separate county-by-domain

interaction models tested effect modification. Two-sided p<0.05 was used for nominal statistical significance. Analyses were done in SPSS version 26.

Ethical considerations

Ethical approval for the study was obtained from the Kenya Methodist University, Institutional Scientific Ethics Review Committee (KeMU/ISERC/HSM/05/2025). A research permit was also obtained from the National Commission for Science, Technology and Innovation NACOST/P/25/417801). Permission to conduct the study was granted by the participating hospitals, and a written informed consent was obtained from all participants before data collection vide NOs ERC/307/04/2025(Kakamega) and BCG/CS/100/36/2025 (Baringo).

RESULTS

Participant characteristics

The adult sample comprised 243 participants, 56.4% from Kakamega and 43.6% from Baringo. Gender, adult age categories and education distributions did not differ significantly between counties (Table 1).

Table 1. Adult participant characteristics by county (n=243)

Characteristic	Total n (%)	Kakamega n (%)	Baringo n (%)	p-value
Gender - Male	132 (54.3)	74 (54.0)	58 (54.7)	1
Female	111 (45.7)	63 (46.0)	48 (45.3)	
Age (years) - 18-29	74 (30.5)	50 (36.5)	24 (22.6)	0.091
30-39	85 (35.0)	47 (34.3)	38 (35.8)	
40-49	24 (9.9)	11 (8.0)	13 (12.3)	
>=50	60 (24.7)	29 (21.2)	31 (29.2)	
Education - No formal education	100 (41.2)	54 (39.4)	46 (43.4)	0.477
Primary education	75 (30.9)	42 (30.7)	33 (31.1)	
Secondary education	28 (11.5)	15 (10.9)	13 (12.3)	
College	26 (10.7)	19 (13.9)	7 (6.6)	
University	14 (5.8)	7 (5.1)	7 (6.6)	
P-values are from chi-square tests. Percentages for county columns are within county. The 58 respondents coded as younger than 18 years were excluded a priori to align the analysis with the adult study population.				

Scale reliability and county comparisons

Internal consistency ranged from alpha=0.69 for utilization to 0.80 for patient readiness. Mean utilization was 3.82±0.73 and did not differ by county. Baringo had a higher patient-readiness mean and a lower infrastructure-capability mean at $p<0.05$, but neither remained statistically significant after Holm adjustment for the five county scale comparisons (adjusted $p=0.149$ and 0.165, respectively) (Table 2).

Table 2. Reliability and county comparison of telemedicine utilization and readiness scores

Construct	Items	Alpha	Overall mean	Kakamega	Baringo	Difference* (95% CI)	p-value
Telemedicine utilization	7	0.69	3.82 ± 0.73	3.85 ± 0.71	3.79 ± 0.76	-0.06 (-0.25- 0.13)	0.553
Patient readiness	7	0.8	3.89 ±	3.80 ± 0.80	4.02 ± 0.77	0.22 (0.02- 0.42)	**0.03**

			0.79				
Organizational readiness	6	0.7	3.89 ± 0.76	3.81 ± 0.79	3.99 ± 0.72	0.19 (-0.01- 0.38)	0.057
Human-resource capacity	6	0.72	3.97 ± 0.70	3.95 ± 0.68	3.99 ± 0.73	0.04 (-0.14- 0.22)	0.665
Infrastructure capability	5	0.71	3.76 ± 0.90	3.86 ± (.80	3.62 ± 0.99	-0.24 (-0.48- 0.01)	**0.041**
**Difference = Baringo minus Kakamega. Welch tests were used. Scores range from 1 to 5. P-values are unadjusted; none of the five county comparisons remained significant after Holm correction.*							

Associations with telemedicine utilization

None of the four readiness domains had a statistically significant bivariate correlation with utilization (Table 3). Spearman coefficients were similarly small. In the adjusted robust regression, no readiness domain, county, sex, age category or education category was independently associated with utilization (Table 4). There was no evidence that county modified the association between any readiness domain and telemedicine utilization; all county-by-domain interaction terms were non-significant (Table 4).

Table 3. Bivariate correlations with telemedicine utilization (n=243)

Predictor	Pearson r	95% CI	p-value
Patient readiness	0.045	-0.251	0.485
Organizational readiness	0.077	-0.251	0.233
Human-resource capacity	-0.057	-0.251	0.38
Infrastructure capability	-0.059	-0.251	0.356

Table 4. Multivariable robust linear regression for telemedicine utilization (n=243)

Predictor	B	Robust SE	95% CI	p-value
Baringo vs Kakamega	-0.104	0.11	-0.43	0.343
Female vs male	-0.015	0.1	-0.391	0.878
Age 30-39 vs 18-29	0.016	0.119	-0.467	0.896
Age 40-49 vs 18-29	0.17	0.151	-0.59	0.26
Age >=50 vs 18-29	-0.105	0.153	-0.598	0.491
Primary vs no formal education	-0.182	0.123	-0.482	0.138
Secondary vs no formal education	0.039	0.144	-0.563	0.788
College vs no formal education	-0.125	0.181	-0.709	0.49
University vs no formal education	-0.19	0.234	-0.918	0.417
Patient readiness score	0.054	0.066	-0.258	0.408
Organizational readiness score	0.093	0.075	-0.294	0.214
Human-resource capacity score	-0.092	0.053	-0.206	0.08
Infrastructure capability score	-0.068	0.052	-0.203	0.19
HC3 robust standard errors. R2=0.049; adjusted R2=-0.005; robust model F=0.845, p=0.612. Reference categories: Kakamega, male, age 18-29 years, no formal education.				

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Figure 1 shows that mean telemedicine utilization was broadly similar in Kakamega and Baringo Counties. However, Baringo recorded higher mean scores for patient readiness and organizational readiness, while human-resource capacity was comparable between the two counties. In contrast, infrastructure capability was lower in Baringo than in Kakamega. Overall, the figure suggests variation in selected readiness domains between counties, but these differences were not mirrored by a corresponding difference in telemedicine utilization.

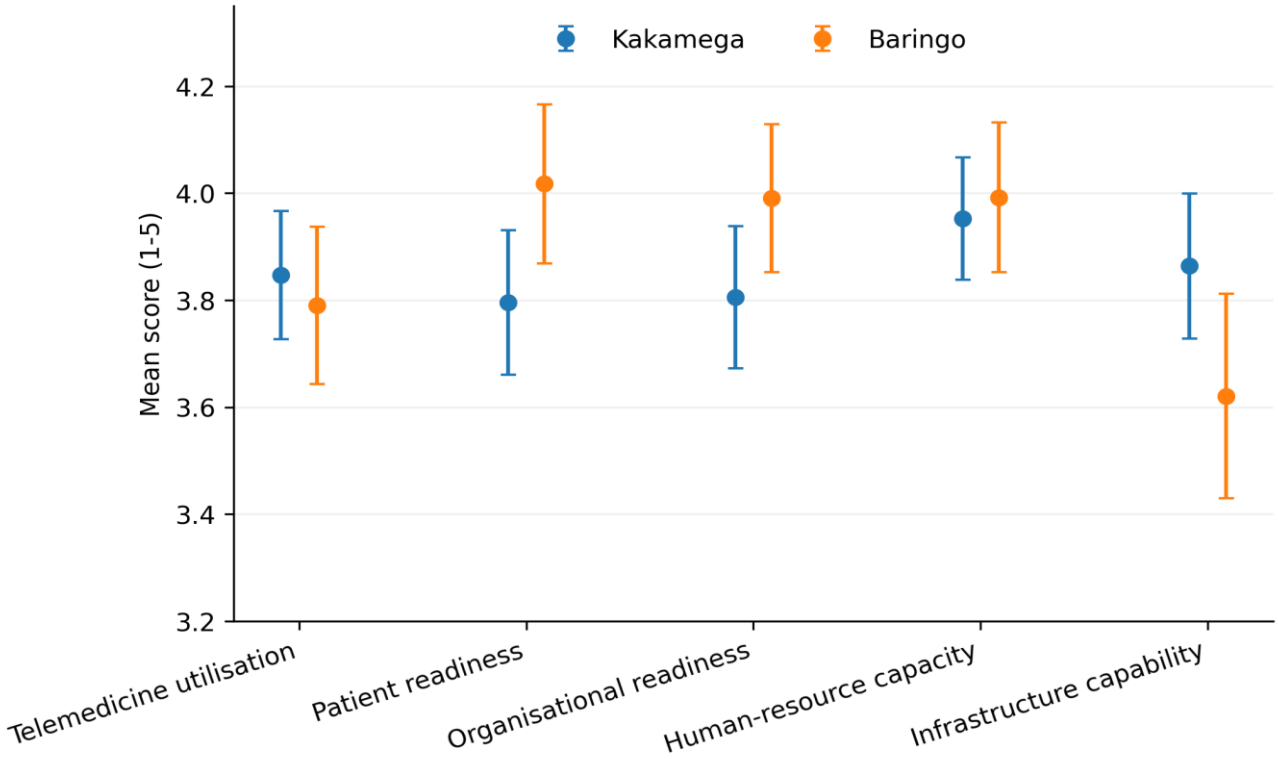

Figure 1. Mean telemedicine utilization and readiness scores by county. Error bars show 95% confidence intervals.

DISCUSSION

This study separated telemedicine utilization from perceived readiness and found little evidence that the two moved together. Mean utilization was similar in Kakamega and Baringo, none of the readiness domains correlated significantly with utilization, and the fully adjusted model explained approximately 5% of the observed variance. The county-by-readiness interactions were also null. These findings do not show that readiness is unimportant; rather, the broad readiness scores used here did not discriminate self-reported utilization within this sample.

The finding is relevant because telemedicine acceptance and use are often discussed together. Prior studies show that perceived usefulness, usability and confidence can influence acceptance,[10,11] yet access to actual telemedicine also depends on digital inclusion, modality, connectivity and service organization.[13-18] Thus, a favorable attitude or readiness score may coexist with practical constraints that are not captured by a broad composite. Our data cannot identify which unmeasured constraints mattered most, and causal explanations would be inappropriate at this stage.

The county profile adds a cautious contextual observation. Baringo participants reported ostensibly higher patient readiness but lower infrastructure capability than Kakamega, while utilization itself remained similar. Because these two differences did not survive multiplicity correction, they should be treated as exploratory signals rather than established county effects. Still, the pattern supports the analytic value of reporting readiness and utilization separately instead of interpreting one as evidence of the other.

The results are also consistent with implementation literature showing that digital-health adoption is a multilevel process rather than a direct consequence of one favourable domain. Reviews in African and other low-resource settings describe interacting technological, organizational, workforce and sustainability constraints.[19-24,26-29] In Kenya, physician experience similarly suggests that telemedicine use is heterogeneous and commonly combined with conventional care.[25] This study extends that discussion to adults with mobility disabilities, a group for whom reducing travel may be especially valuable but who may also encounter layered accessibility barriers.[1-6]

For practice, the data support a measurement implication more strongly than a causal intervention claim. Programmes should monitor completed telemedicine encounters, failed or interrupted connections, modality used, need for caregiver assistance and reasons for non-use alongside readiness surveys. This would distinguish willingness from realised access and allow future analyses to identify specific bottlenecks. Disability-inclusive implementation should also assess whether platforms and workflows accommodate functional limitations rather than assuming that remote delivery is intrinsically accessible.[3-5]

Strengths include use of the corrected patient dataset, adult-only analysis, reconstruction of scale scores from raw item responses, county comparison with confidence intervals, robust multivariable modelling and explicit interaction testing. Important limitations remain. The cross-sectional design prevents temporal or causal inference. All measures were self-reported, and the utilization scale had borderline internal consistency (alpha=0.69). The dataset did not contain direct objective measures of device ownership, connectivity, completed consultation counts or travel avoided. The broad readiness composites may combine distinct dimensions with different relationships to use. The analysis involved two hospitals and cannot represent all adults with mobility disabilities in either county or nationally.

CONCLUSIONS

Among the adults with mobility disabilities in Kakamega and Baringo, telemedicine utilization was similar across counties and was not independently associated with patient, organizational, workforce or infrastructure readiness scores. County did not modify these relationships. The findings support measuring realised telemedicine use directly and interpreting readiness scores as complementary, not interchangeable, indicators of access.

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