

Health Workers' Acceptance and Satisfaction on the Usability of the Digital Health Goods, in Kono District, Sierra Leone

Pierre Ricard Pognon, Foday Boima, Zeleke Abebaw Mekonnen 

Strategic Health Information System, Partners in Health, Freetown, Sierra Leone

Correspondence: Zeleke Abebaw Mekonnen, Research Specialist, Partners in Health, P.O. Box: 298, Freetown, Sierra Leone, Tel +23233615423, Email zelekeabebaw7@gmail.com

Introduction: Digital health systems implementation in developing countries is increasing exponentially, and digital health interventions are essential tools to improve healthcare access and quality. In contrast, the evidence base is meager about the acceptance and satisfaction of end users towards digital health goods. Hence, this study aims to evaluate the acceptance and satisfaction of end users on the usability of digital goods in Sierra Leone.

Methods: Health facility-based cross-sectional study design was employed, and a total of 151 participants were included. Data were collected using a validated data collection tool. Initially, descriptive data analysis was done. Finally, bivariate and multivariate logistic regressions were applied to identify predictors for user acceptance of digital health goods. Finally, findings are presented as AORs along with 95% CIs.

Results: The study considered 151 respondents for analysis. In this study, 72.2% with 95% CI: 64.4–78.8% of respondents have good acceptance of the digital health systems. The findings revealed that 49.7% and 45.7% of respondents were strongly satisfied and satisfied, respectively. The regression analysis indicated that perceived ease of use [AOR=5.56; 95% CI: 2.17, 14.26], digital health system type [AOR=0.18, 95% CI: 0.06, 0.55], and frequency of digital system use [AOR=0.04; 95% CI: 0.01, 0.41] were predictors of user acceptance. The major barriers for successful implementation were inability to be used offline, being slow, and taking longer time to input information in the digital systems.

Conclusion: End user acceptance and satisfaction with digital health goods were high. Perceived ease of use, digital system type, and frequency of using digital systems are predictors of user acceptance. Major barriers to digital systems implementation include inability to be used offline and taking longer time to input information in the systems. Long-term system acceptance could be achieved through addressing end user preference and potential barriers of implementation.

Keywords: user acceptance, technology acceptance model, satisfaction, digital health, Sierra Leone

Introduction

Digital or electronic health is all about harnessing digital tools and data analysis to really understand health behaviors and provide a more tailored clinical care for individuals.^{1,2} It encompasses health information technology (HIT), mHealth apps, electronic medical records, telehealth services, and wearables. Consequently, digital health tools are adopted in healthcare facilities for various purposes.³

Digital technology plays a vital role to make healthcare systems efficient and effective, significantly improving health outcomes when embraced by health professionals. On the other hand, resistance to adoption can diminish its potential benefits. The Electronic Medical Record (EMR) is an essential system that enhances the quality of health services, improves safety of patients, and reduces costs by ensuring required access to health information. Nonetheless, the cautious approach of healthcare workers regarding its adoption highlights the need for careful implementation to maximize its effectiveness.⁴

Over the years, transitioning from paper-based systems to EMR had been a challenge for many hospitals and physicians. Accordingly, more than 50% of digital health implementations failed due to a lack of technical, operational, leadership, or organizational culture readiness.⁵ On the other hand, there has been a growing demand from clients and patients to access and gain insight into their own health information, especially concerning their health records.⁶

Following this, Sub-Saharan Africa (SSA) has rapidly expanded cellular infrastructure, eHealth, and mHealth use as an approach to leverage for collecting data and exchanging health information.⁷ Despite this progress, challenges using digital health tools such as EMRs remain a top complaint among health workers even though these end users recognized the value and do not want to go back to paper-based.⁸

A systematic review of thirty-six studies from ten countries revealed that experiences with digital health tools, such as electronic health records (EHRs), varied widely, with challenges being more common shortly after their implementation.⁹ Of these systematic reviews, studies from seven countries indicated the benefits of the digital systems.^{10–16} Another conducted in Ghana found that using mHealth as a digital tool enhances midwives' efficiency and effectiveness by aiding clinical decision-making, offering information resources, and lessening administrative tasks.¹⁷

The Technology Acceptance Model (TAM) that we used as a framework to guide this study also stipulated that user acceptance of digital technology is correlated with perceived ease of use and perceived usefulness.¹⁸

Our literature review indicated that Sierra Leone's healthcare infrastructure is challenged with multifaceted factors that are unequally distributed throughout the country, with lower access to health services for those in rural areas.¹⁹ This demands access to technology and implementation of large-scale digital health initiatives to improve access and quality of care towards universal health coverage.^{19,20} However, there is no study done in Sierra Leone to assess the end users' perception and satisfaction on digital health goods. Thus, this study aimed to assess the extent of current digital health goods acceptance level and identify the factors that determine the use of digital health goods in selected health facilities of Kono district, Sierra Leone.

Methods

Setting

The study was done in selected health facilities of Kono, with an estimated population exceeding 600,000 people.²¹ In 2015, electronic medical records and CommCare digital health tools were implemented in health facilities supported by Partners In Health-Sierra Leone (PIH-SL) to transform the healthcare environment by digitizing and streamlining patient health information management. The research focused on PIH-SL-supported facilities, particularly involving users of CommCare and EMR (OpenMRS) at Koidu Government Hospital, which is a secondary healthcare center, and Wellbody Clinic, a primary healthcare center. The EMR is used to collect real-time data at the point of care, and the CommCare app is also used to collect primary data in both facilities. These electronic mobile and/or point-of-care systems are introduced to collect patient data with the purpose to support clinical decision-making.

Study Design

For this study a cross-sectional design was applied.

Study Population

The participants were community health workers, clinicians, health information professionals, and operations staff in PIH-SL-supported health facilities. All participants are users of either an EMR or a CommCare system, coming from different professional backgrounds. Those health workers who had less than three months of experience in the health facilities were excluded.

Sample Size and Data Collection

The study included all health workers (151) in both Koidu Government Hospital (KGH) and Wellbody Clinic who are users of digital health products, with data collection taking place from 25 May to 16 June, 2023. To collect data, a validated structured questionnaire was adapted from existing literature mainly from the technology acceptance model.¹⁸

The questions focused on the usability and satisfaction towards the current digital health goods, as well as the factors influencing their use. Non-identifiable demographic data, such as age, gender, duration of digital usage, and familiarity with technology were also collected. To measure the outcome variable, a five-point Likert scale questionnaire with multiple items was used. The internal consistency for the outcome variable (user acceptance) was tested using the proposed items, and it was deemed acceptable (Cronbach alpha: 0.88).

To ensure anonymity and minimizing interviewer bias, data collectors received specific training tailored to the survey and were kept blind to the specific hypotheses of the study. Besides, pre-testing of the data collection tool was done, and necessary revisions have been made accordingly. Data were collected using the CommCare app, and data quality was ensured through daily oversight, spot-checks, and reviews of the completed questionnaires by trained staff. The principal investigator and supervisors verified the questionnaires for completeness, accuracy, and consistency on a daily basis.

Study Variables

In this study, the outcome variable was the acceptance of digital health systems by end users. Independent variables included the sociodemographic characteristics of the respondents and IT-related factors.

Data Analysis

Initially, data cleaning and processing were done using STATA version 15 software. User acceptance as a continuous outcome variable was not normally distributed even after log transformation, and we went for non-parametric test (logistic regression) to look for its associated factors. Scores for each item of questions for the latent variables (user acceptance) were compiled and used the median value of the total score (not normally distributed continuous data) to dichotomize the variable into “good” or “bad” based on the final score.

Descriptive data analysis including frequency and percentage for categorical variables was done. Further, median with corresponding interquartile range (IQR) was computed for continuous variables. A bivariate and multivariate binary logistic regression analysis was employed to assess the factors that are associated with user acceptance of digital health systems. The findings were presented as odds ratios along with their 95% confidence intervals.

Multicollinearity among the independent variables was assessed using variance inflation factor (VIF), with a cutoff point of 10. Additionally, the Hosmer and Lemeshow test was applied to evaluate the model fitness.

Ethical Considerations

Ethical clearance was secured from Partners In Health Sierra Leone Research and Ethics Committee, as well as from the national Sierra Leone Ministry of Health Sierra Ethics and Scientific Review Committee. To conduct this study, approval was sought from the management teams of the health facilities before beginning data collection and analysis.

Since the study evaluated the implementation of digital health systems and includes professional health workers as participants without any associated risks, informed consent (verbal) was obtained from respondents. Along with this, their voluntary responses were recorded as “Yes” or “No” by data collectors using the CommCare application that has been used for data collection. The consent form along with the study protocol was approved by the Institutional Review Board (IRB). Finally, data were stored securely and anonymized.

Results

Characteristics of Respondents

This study considered 151 respondents for analysis, and there was no missing data. The descriptive analysis showed that the median (IQR) age of respondents was 32 (9) years. Further, the majority of respondents (67%) are below 35 years. Among the respondents, 60% were males, and 43% have completed university education.

Pertaining to the digital health goods, the majority (80.8%) have used CommCare, and most of the end users (97.3%) were trained on these digital platforms. Similarly, the majority (93%) of the respondents were using the digital platforms always [Table 1].

Table 1 Socio-Demographic Characteristics of Respondents [N=151]

Characteristics	Frequency	Percentage
Age in complete years: Median (IQR) 32 (9)		
≤34	101	66.9
35–44	27	17.9
≥45	23	15.2
Gender		
Female	61	40.4
Male	90	59.6
End user		
Community health worker	119	78.8
Clinician	32	21.2
Educational status		
Junior secondary and below	22	14.6
Senior secondary	64	42.4
University	65	43
Digital Health System		
CommCare	122	80.8
EMR	29	19.2
Training on CommCare/EMR use		
No	4	2.7
Yes	147	97.3
Platform Use		
Not always	11	7.3
Always	140	92.7

Digital Health Systems Acceptance by End Users

Findings showed that 64% and 30% agreed and strongly agreed, respectively, that use of digital health platforms in the work place helps to accomplish tasks more quickly. Similarly, 65% and 58% agreed that the digital platforms improve work performance and productivity, respectively.

Further, 71% and 67% of respondents agreed that the digital systems are flexible to interact with and are easy to use, respectively. Looking at user acceptance, 79% agreed that the EMR/CommCare systems are pleasing, and 73.5% agreed that the systems have the functions and capabilities as per their expectation. Likewise, 70% of respondents agreed that the information stored in these systems has been clearly presented [Table 2].

Overall Score on End User Acceptance

Composite variables considered in the TAM were measured with different items using a Likert scale questionnaire. Accordingly, median scores (IQR) for PU, PEU, and end user acceptance were 25 (3), 25 (2), and 32 (3), respectively. Also, the minimum and maximum overall scores for the user acceptance measured using 8 items was 27 and 40, respectively [Table 3].

Table 2 Score of Items on Composite Variables of User Acceptance, PU, and PEU [N=151]

Composite Variable	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Perceived Usefulness (PU)	Using CommCare/EMR in my work helps me to accomplish tasks more quickly	1 (0.7)	1 (0.7)	8 (5.3)	96 (63.65)	45 (29.8)
	Using CommCare/EMR improves my work performance	0 (0)	0 (0)	4 (2.7)	99 (65.5)	48 (31.8)
	Using CommCare/EMR increases my work productivity	0 (0)	0 (0)	10 (6.6)	88 (58.3)	53 (35.1)
	Using CommCare/EMR enhances my effectiveness at work	0 (0)	0 (0)	4 (2.7)	103 (68.2)	44 (29.1)
	Using CommCare/EMR make it easier to do my work	0 (0)	0 (0)	1 (0.7)	103 (68.2)	47 (31.1)
	I find CommCare/EMR useful in my work	0 (0)	0 (0)	2 (1.3)	93 (61.6)	56 (37.1)
Perceived Ease of Use (PEU)	Learning to navigate among CommCare/EMR features has been easy for me	0 (0)	0 (0)	11 (7.3)	104 (68.9)	36 (23.8)
	I find it easy to get CommCare/EMR to do what I want it to do	0 (0)	4 (2.7)	3 (2)	110 (72.8)	34 (22.5)
	My interaction with CommCare/EMR is clear and understandable	0 (0)	1 (0.7)	4 (2.7)	105 (69.5)	41 (27.1)
	I find CommCare/EMR to be flexible to interact with	0 (0)	2 (1.3)	5 (3.3)	108 (71.5)	36 (23.9)
	It is easy for me to become skillful at using CommCare/EMR	0 (0)	0 (0)	4 (2.7)	112 (74.1)	35 (23.2)
	I find CommCare/EMR easy to use	0 (0)	0 (0)	4 (2.7)	101 (66.8)	46 (30.5)
User acceptance	I use CommCare/EMR frequently	0 (0)	0 (0)	5 (3.3)	104 (68.9)	42 (27.8)
	I use CommCare/EMR for a variety of purpose	1 (0.7)	22 (14.6)	13 (8.6)	80 (52.9)	35 (23.2)
	I would recommend the technology to others	0 (0)	0 (0)	3 (2)	112 (74.2)	36 (23.8)
	The interface of the system CommCare/EMR is pleasant	0 (0)	0 (0)	5 (3.3)	119 (78.8)	27 (17.9)
	It was easy to learn to use this system CommCare/EMR	0 (0)	2 (1.3)	9 (6)	114 (75.5)	26 (17.2)
	I like using the interface of this system CommCare/EMR	0 (0)	1 (0.7)	6 (4)	122 (80.8)	22 (14.6)
	The information (such as online help, on-screen messages, and other documentation) provided with this system is clear	0 (0)	2 (1.3)	8 (5.3)	106 (70.2)	35 (23.2)
	This system has all the functions and capabilities I expect it to have	0 (0)	2 (1.3)	11 (7.3)	111 (73.5)	27 (17.9)

Table 3 Overall Likert Scale Score of Composite Variables [N=151]

Composite Variable	Minimum	Maximum	Median Score	IQR [Q3-Q1]
Perceived usefulness (6 items)	20	30	25	[27–24]
Perceived ease of use (6 items)	18	30	25	[26–24]
User acceptance (8 items)	27	40	32	[34–31]

Table 4 Proportion of End User Acceptance, Perceived Ease of Use, and Perceived Usefulness [N=151]

Composite Variable	Proportion	95% CI
User acceptance	72.2%	64.4%–78.8%
Perceived usefulness	59.6%	51.5%–67.2%
Perceived ease of use	52.3%	44.3%–60.1%

Level of End User Acceptance, PU, and PEU

In this study, 72.2% with 95% CI: 64.4–78.8% of respondents have good acceptance of the digital health systems. More than half (59.6% with 95% CI: 51.5–67.2%) of respondents perceived the digital health systems as useful, and 52.3% with 95% CI: 44.3–60.1% perceived the systems as easy to use [Table 4].

Overall Satisfaction of End Users to Use the Digital Health Systems

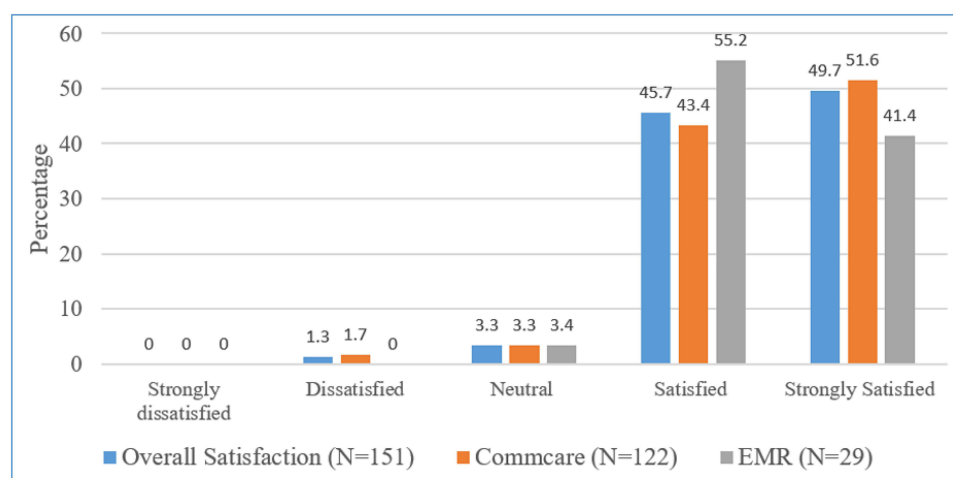
The findings showed that a total of 95.4% of participants were either strongly satisfied (49.7%) or satisfied (45.7%) with the digital health goods. Looking at CommCare use, 51.6% and 43.4% of respondents were strongly satisfied and satisfied, respectively. Similarly, among EMR end users 96.6% of them were either strongly satisfied (41.4%) or satisfied (55.2%) [Figure 1].

Quality of Captured Data in the Digital Platforms

The overall quality of captured data in the digital systems was reported to be high (74.8%) [Figure 2]. Among users of the CommCare platform, 72.3% reported that the data being captured were of high quality, and an additional 22.1% said the data quality was medium. Likewise, 68.9% of EMR users reported that the data being captured were of high quality, while the remaining 31.1% reported that data were of medium quality.

Barriers to Successful Use of the Digital Platforms

The barriers to successful use of the CommCare and EMR digital platforms were mentioned by respondents, with a potential multiple response. The major barriers were inability to be used offline ($n=48$), being slow ($n=28$), requiring high internet bandwidth ($n=21$), and taking longer time to input information in the system ($n=20$) [Figure 3].

**Figure 1** Satisfaction of end users with digital health goods [N=151].

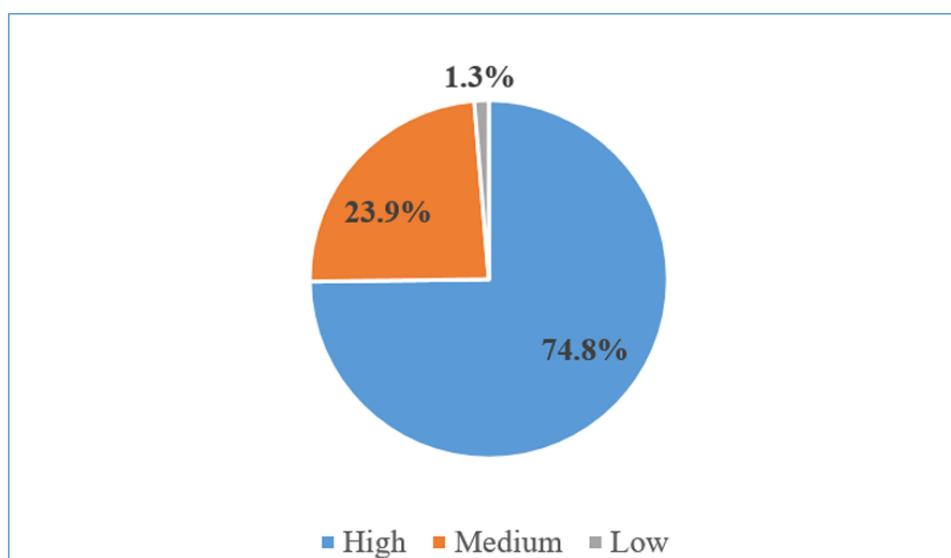


Figure 2 Quality of data being captured in the digital platforms [N=151].

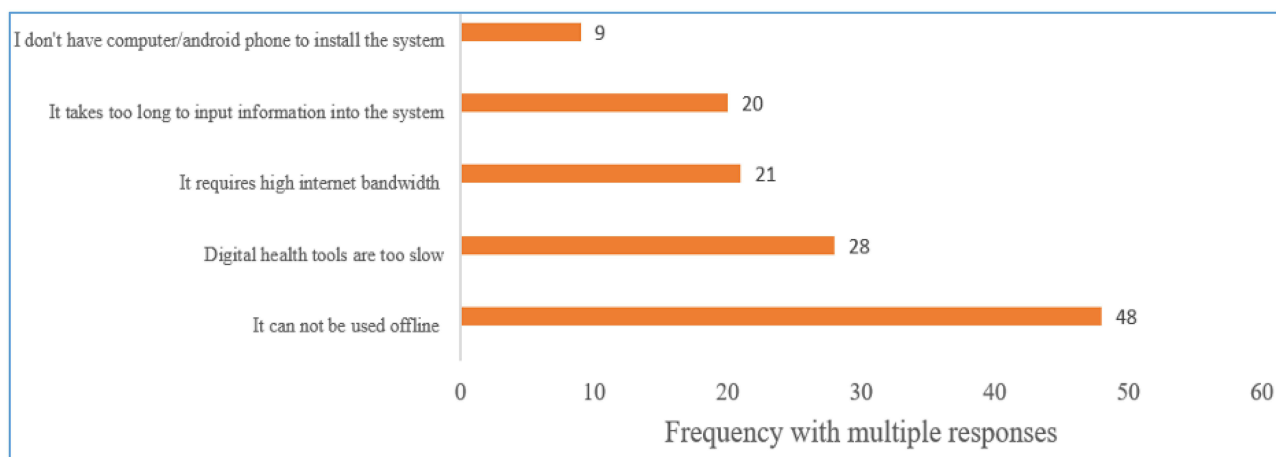


Figure 3 Barriers to successful use of the digital platforms [N=151].

Correlation of End User Acceptance, Perceived Usefulness, and Perceived Ease of Use

Correlations among the constructs of the technology acceptance model were tested using Spearman correlation, taking into account the skewed distribution of the constructs. Accordingly, the findings highlighted a positive significant correlation among user acceptance and PU (Spearman correlation coefficient of 0.445, with a corresponding *P*-value of <0.0001). Similarly, a positive significant correlation has been found between among user acceptance of digital systems and PEU (Spearman correlation coefficient of 0.261, *P*=0.001) [Table 5].

Table 5 Correlation of Constructs Used in Technology Acceptance Model [N=151]

	User Acceptance	Perceived Usefulness	Perceived ease of Use
User acceptance	1		
Perceived usefulness	0.4450 (<i>P</i> <0.0001)	1	
Perceived ease of use	0.2609 (<i>P</i> =0.0012)	0.5695 (<i>P</i> <0.0001)	1

Bivariate and Multivariate Logistic Regression Analyses

Bivariate and multivariate binary logistic regression analyses were conducted to assess the relationship between end user acceptance of digital systems and predictor variables. As a result, variables with a *P*-value of less than 0.2 in the bivariate logistic regression analysis (respondent's educational level, end user type, digital system type, frequency of platform use, and PEU) were included for the multivariate regression analysis.

The variables like age of respondents, gender, training, and PU did not have a statistically significant correlation with the outcome variable. Further, after checking for multicollinearity, the variable end user was removed from the final multivariate regression model.

In the final regression model, the predictors digital system type, frequency of platform use, and PEU had a statistically significant association with user acceptance of digital health systems. In the final model, respondent's educational level had no significant association with the outcome variable.

The findings revealed that PEU positively influences end user acceptance of digital health platforms. After controlling for confounders, respondents who perceived the digital health systems as easy to use have a 5.6 times higher [AOR=5.56; 95% CI: 2.17, 14.26] odds of acceptance as compared with their counterparts.

After controlling for other variables, being an EMR system user has a 82% [AOR=0.18, 95% CI: 0.06, 0.55] lower odds of acceptance as compared to the CommCare system. Moreover, those end users who were not using the digital health systems always have lower [AOR=0.04; 95% CI: 0.01, 0.41] odds of acceptance as compared to those who use the system always [Table 6].

Model Fitness and Multicollinearity Test

A multicollinearity check was conducted for the covariates considered for the final regression analysis. The mean VIF score was 4.79, and the variable end user type had a VIF value of 11.17. Hence, it was dropped from the final model. The Hosmer and Lemeshow goodness-of-fit test was also performed. The findings indicated that the model fits the data (*P*: 0.653).

Table 6 Bivariate and Multivariate Regression Analyses of Variables Associated with User Acceptance of Digital Health Systems [N=151]

Characteristics	User acceptance [N=151]		Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
	Poor (n)	Good (n)		
Level of Education				
Junior secondary and below	5	17	1	1
Senior secondary	15	49	0.96 (0.31, 3.04)	2.35 (0.64, 8.67)
University	22	43	0.57 (0.19, 1.76)	2.24 (0.57, 8.78)
Digital health system				
CommCare	23	99	1	1
EMR	19	10	0.13 (0.05, 0.29)	0.18 (0.06, 0.55)
Platform use				
Not always	10	1	0.03 (0.01, 0.24)	0.04 (0.01, 0.41)
Always	32	108	1	1
Perceived Ease of use				
No	32	40	1	1
Yes	10	69	5.52 (2.46, 12.41)	5.56 (2.17, 14.26)

Discussion

The study's findings revealed that end user acceptance and satisfaction with digital health systems was relatively high. Perceived ease of use, digital system type (CommCare or EMR), and frequency of platform use were found to have a significant association with user acceptance of digital health systems.

The relatively higher level of end user acceptance to digital health systems reported in this study was consistent with a previous study conducted in the Philippines²² while being higher than in studies conducted in Ethiopia.^{23,24} This strong acceptance of digital systems may be attributed to the support provided by Partners in Health, which enhances capacity building and service utilization, thus maximizing the technology's impact on healthcare delivery. Additionally, this study indicated high levels of end user satisfaction with digital health systems, contributing to improved work flow, service quality, and health outcomes. A similar study also reported that EMR systems improve stakeholder satisfaction by improving access to healthcare information.²⁵

The successful implementation and impact of a digital system hinges on its usage and user perceptions. Our findings indicated that ease of use of the digital system was correlated with end user acceptance of digital health goods, which is consistent with prior studies.^{26–30}

One potential explanation is that the less effort end users need to invest in using the system, the more likely they are to continue using it. The Technology Acceptance Model (TAM) emphasizes that ease of using the system is a significant factor in user acceptance and should be considered by those designing or implementing effective systems.¹⁸ Additionally, research on Community Health Information Systems (CHIS) in Ethiopia highlighted the importance of making these systems easy and enjoyable for community health workers (CHWs) to use for successful and effective implementation.²⁴

A user-friendly system is viewed as less time-consuming, which significantly impacts clinicians' willingness to use digital health products.²⁷ Hence, it is crucial for developers of digital health systems to prioritize ease of use to encourage end users to engage with and adopt the technology. Whenever the digital system requires minimal effort to navigate, it can positively influence users' intentions to utilize those systems. Therefore, ensuring that eHealth technologies are straightforward and user-friendly for healthcare providers is essential for their long-term adoption and sustainability.

Providing technical support for end users is essential for successfully implementing new health technologies. However, insufficient technical training and support often poses a significant challenge in the implementation of EMR systems³¹ and the use of CommCare.³² In our study, training about the digital system has shown no association with user acceptance of digital health goods. The possible explanation for this could be related to the fact that almost all of the respondents in our study have been trained on CommCare and EMR, which creates an opportunity to familiarize themselves and engage with these systems. On the other hand, a study pointed out that technical inabilities to using the digital health system affect its sustainable implementation.²⁴ Another report also outlined that with the rapid development of digital health goods, insufficient training and a lack of experience with issues related to new health applications may have contributed to the low acceptance rates among health professionals.³³ A study from Nigeria also indicated that technical skills were positively and significantly linked to willingness of end users to use digital platforms.³⁴

The study findings showed that CommCare users are more likely to have higher acceptance as compared to EMR users, which could be related to the differences in the design, complexity, and amount of time required to enter data across the two digital platforms. A study by El Mahalli et al³⁵ also reported that data capturing is often burdensome and time-consuming for users, as strong typing skills are necessary to input clinical information and additional notes into the digital system. Consequently, the amount of time spent on patient record entry has become a prevalent concern among users of digital health products. Another study also indicated that health workers are resistant to adopt EMR systems with the common reason that it usually did not meet the specific need in the local context.³⁶ This reflects that additional efforts are essentially required from digital system developers and stakeholders implementing the system to enhance system designs and complexities in digital system packages.

Our findings also indicated that those end users who used the systems always have better acceptance to the digital health platforms. A report from other studies indicates that for end users to accept new health technology and recognize

its value they need considerable experience with the system.^{37–39} As evidenced from developing countries, the end user experience was found to be crucial for sustainable adoption of eHealth systems.³⁰

In this study, perceived usefulness (PU) did not significantly influence user acceptance of digital health goods in the multivariable regression analysis. This might be related to the fact that users may be resistant to changing their established health management practices, preferring traditional methods over adopting new technologies. On the other hand, the Spearman correlation analysis showed that perceived usefulness and user acceptance has a positive correlation that was statistically significant. Other studies also reported that perceived usefulness about the digital system has a positive significant association with digital health system acceptance.^{26,28–30,40,41}

The Technology Acceptance Model indicates that end users are primarily motivated to adopt an application based on its functionality and are willing to tolerate some usability challenges if the system offers essential features.¹⁸ A similar study on the use of CommCare in Malawi found that community health workers believed digital health systems would reduce time spent on reporting by alleviating the burden of carrying bulky registers and allowing them more time for other tasks.³² The usefulness of digital health systems is linked to the availability and sufficiency of data, which is essential for providing high-quality healthcare information to support users' daily activities. The study findings also revealed that the quality of data reported in these digital health systems was notably high, at 74.8%.

Currently, EMR and CommCare systems are being implemented in health facilities due to their anticipated benefits for safety and quality of care. Our findings revealed that the major barriers to digital health systems were inability to be used offline, being slow, requiring high internet bandwidth, and taking longer time to input information in the system. A scoping review also indicated that the most common obstacles contributing to the relatively low adoption rates of EMR systems, as perceived by end users, include a lack of mentorship and training, system complexity, the time needed to be familiarized with the system, and security issues.⁴² A study from Indonesia also indicated that health service management must focus on infrastructure availability and user-related factors to overcome the challenges of successfully implementing digital health systems in developing countries.³⁹

Implications for Practice and Future Research

Though digital health platforms like EMR and CommCare are relatively new developments in the Sierra Leone context, yet their impact on clinical practices is becoming increasingly apparent. However, the acceptance of digital health systems in resource-limited settings, which have traditionally relied on paper-based methods, is still underrepresented in the current literature. This study has important implications for system developers, healthcare providers, and health program managers at different levels of the health system.

For effective implementation of digital health goods, understanding user acceptance is vital. Our findings demonstrate the high acceptability of end users in developing countries, which could enhance operational efficiency and service quality if sustained. Thus, policymakers and implementers aiming to expand digital health systems in these settings should prioritize user acceptance in their intervention design and execution.

The study findings also showed that perceived ease of use and digital system type have an effect on user acceptance. Consequently, a comprehensive understanding of end users' needs and concerns that shape their perceived value and requirements is essential, as these factors ultimately influence their behavior. Given the limited evidence regarding user acceptance of digital health systems in Sierra Leone, this serves as baseline information for researchers, particularly in resource-constrained environments.

Although the study represents a snapshot in time, policymakers, implementers, and developers of the EMR can use this information to refine implementation processes and better anticipate user preferences for future initiatives. The findings also indicate that health professionals are primarily concerned with the added value of the innovation and its ease of use. This suggests that for the implementation of EMR/CommCare to be successful, the system must operate flawlessly from the outset and be user-friendly to gain the support of health workers as end users of the systems.

Findings from this study can also serve as guidance for health facility managers in developing effective policies and strategies to address negative tendencies and promote the factors that contribute to the successful implementation of digital health systems in the local context.

Limitations

Since the study was cross-sectional, it was not possible to establish temporal relationship. Given that we have used interviewer-administered questionnaires, it might lead to interviewer bias. The continuous outcome variable (user acceptance) was not normally distributed even after log transformation and was collapsed into binary form for non-parametric test which might create information loss while collapsed. This study has been done in purposely selected PIH-SL-supported healthcare facilities in Kono that implemented global digital health goods, and findings might not be representative of the implementation status at national level.

Conclusion

End user acceptance and satisfaction with digital health goods was relatively high. Perceived ease of use, digital health system type, and frequency of use had a significant influence on end user acceptance of digital health systems. The major barriers to digital health systems were inability to be used offline, being slow, requiring high internet bandwidth, and taking longer time to input information in the system.

To ensure long-term acceptance of the system, digital health solutions should be user-friendly for healthcare workers. High levels of end user acceptance could also be achieved through addressing potential barriers of implementation. Further, those implementing digital health systems must select and determine appropriate digital health interventions tailored to the local context of resource-limited settings.

Data Sharing Statement

Data underlying these results can be made available from the corresponding author upon reasonable request.

Ethical Approval

The study received approval from the national Sierra Leone Ethics and Scientific Review Committee. Furthermore, permission for the study was obtained, and informed consent was secured from all respondents involved in this research.

Acknowledgments

We would like to thank the included health facilities' leadership for supporting this research work. We also acknowledge the data collectors (Tamba Gborie and Antony George) and the study participants. Finally, we extend our gratitude to Dr. Kilongo Papy Mulailwa, Dr. Jean Gregory Jerome, and Vivan Chang for their overall support during the conduct and write-up of this study.

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.

Funding

This study was conducted with support from the Wagner foundation provided to Partners In Health Sierra Leone.

Disclosure

The authors report no conflicts of interest in this work. This paper/the abstract of this paper will be presented at the 14th International Nursing Research Congress as a poster presentation/conference talk with interim findings (<https://nursingresearchcongress.com/speaker-details.php?speaker=zeleke-abeaw-mekonnen>).

References

1. Bhavnani SP, Narula J, Sengupta PP. Mobile technology and the digitization of healthcare. *Eur Heart J*. 2016;37(18):1428–1438. doi:10.1093/eurheartj/ehv770
2. Dallery J, Kurti A, Erb P. A new frontier: integrating behavioral and digital technology to promote health behavior. *Behav Analyst*. 2015;38(1):19–49. doi:10.1007/s40614-014-0017-y
3. Coran P, Goldsack JC, Grandinetti CA, et al. Advancing the use of mobile technologies in clinical trials: recommendations from the clinical trials transformation initiative. *Digit Biomarkers*. 2019;3(3):145–154. doi:10.1159/000503957
4. Mumtaz H, Riaz MH, Wajid H, et al. Current challenges and potential solutions to the use of digital health technologies in evidence generation: a narrative review. *Front Digit Health*. 2023;5. doi:10.3389/fdgth.2023.1203945
5. Houser SH, Johnson LA. Perceptions regarding electronic health record implementation among health information management professionals in Alabama: a statewide survey and analysis. *Perspect Health Inf Manag*. 2008;5.
6. Hägglund M, Desroches C, Petersen C, Scandurra I. Patients' access to health records. *BMJ*. 2019;l5725. doi:10.1136/bmj.l5725
7. United Nations. Foundation. *mHealth for the Developing World*. New York: United Nations; 2010.
8. Friedberg MW, Chen PG, Van Busum KR, et al. Factors affecting physician professional satisfaction and their implications for patient care, health systems, and health policy. *Rand Heal Q*. 2014;3.
9. Sipanoun P, Oulton K, Gibson F, Wray J. The experiences and perceptions of users of an electronic patient record system in a pediatric hospital setting: a systematic review. *Int J Med Inform*. 2022;160:104691. doi:10.1016/j.ijmedinf.2022.104691
10. Alsohime F, Tamsah MH, Al-Eyadhy A, et al. Satisfaction and perceived usefulness with newly-implemented electronic health records system among pediatricians at a university hospital. *Comput Methods Programs Biomed*. 2019;169:51–57. doi:10.1016/j.cmpb.2018.12.026
11. Ghazi Al-Shammari MA, Yasir AA, Al-Doori NM. Application of Electronic Medical Record at Intensive Care Unit in Maternity and Children Hospital. *J Glob Pharma Technol*. 2018;35–40.
12. Matthew Hollenbeck S, Bomar JD, Wenger DR, Yaszay B. Electronic medical record adoption: the effect on efficiency, completeness, and accuracy in an academic orthopaedic practice. *J Pediatr Orthop*. 2017;37:424.
13. Matton MP, Toledano B, Litalien C, Vallee D, Brunet F, Juvet P. Electronic medical record in pediatric intensive care: implementation process assessment. *J Pediatr Intensive Care*. 2015;05(03):129–138. doi:10.1055/s-0035-1569059
14. Raval MV, Rust L, Thakkar RK, et al. Development and implementation of an electronic health record generated surgical handoff and rounding tool. *J Med Syst*. 2015;39(2). doi:10.1007/s10916-015-0202-x
15. Williams DC, Warren RW, Ebeling M, Andrews AL, Teufel RJ. Physician use of electronic health records: survey study assessing factors associated with provider reported satisfaction and perceived patient impact. *JMIR Med Inform*. 2019;7(2):e10949. doi:10.2196/10949
16. Tubaishtat A. Evaluation of electronic health record implementation in hospitals. *CIN - Comput Informatics Nurs*. 2017;35(7):364–372. doi:10.1097/CIN.0000000000000328
17. Vélez O, Okyere PB, Kanter AS, Bakken S. A usability study of a mobile health application for rural Ghanaian midwives. *J Midwifery Women's Heal*. 2014;59(2):184–191. doi:10.1111/jmwh.12071
18. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q Manag Inf Syst*. 1989;13(3):319. doi:10.2307/249008
19. Ministry of Health and Sanitation. *National Health Sector Strategic Plan. 2021-2025*; 2020.
20. Ministry of Health and Sanitation. *National Digital Health Strategy.2018 - 2023*; 2018.
21. Statistics Sierra Leone. *Population and Housing Census*; 2020.
22. De Mesa RY, Galingana CL. Facing the digital frontier: exploring user acceptance of electronic health records in an urban, rural and remote setting in the Philippines. *BMJ Open Qual*. 2024;13:e002621.
23. Ahmed MH, Bogale AD, Tilahun B, et al. Intention to use electronic medical record and its predictors among health care providers at referral hospitals, north-West Ethiopia, 2019: using unified theory of acceptance and use technology 2(UTAUT2) model. *BMC Med Inform Decis Mak*. 2020;20(1). doi:10.1186/s12911-020-01222-x
24. Hailemariam T, Atnafu A, Gezie L, et al. Intention to use an electronic community health information system among health extension workers in rural Northwest Ethiopia: cross-sectional study using the unified theory of acceptance and use of technology 2 model. *JMIR Hum Factors*. 2024;11:e47081.
25. Kamal JIA. Implementation of electronic medical records in developing countries: challenges & barriers. *Int J Acad Res Progress Educ Dev*. 2018.
26. Lu CH, Hsiao JL, Chen RF. Factors determining nurse acceptance of hospital information systems. *CIN - Comput Informatics Nurs*. 2012;30(5):257–264. doi:10.1097/NCN.0b013e318224b4cf
27. Melas CD, Zampetakis LA, Dimopoulou A, Moustakis V. Modeling the acceptance of clinical information systems among hospital medical staff: an extended TAM model. *J Biomed Inform*. 2011;44(4):553–564. doi:10.1016/j.jbi.2011.01.009
28. Struik MHL, Koster F, Schuit AJ, Nugteren R, Veldwijk J, Lambooy MS. The preferences of users of electronic medical records in hospitals: quantifying the relative importance of barriers and facilitators of an innovation. *Implement Sci*. 2014;9(1). doi:10.1186/1748-5908-9-69
29. Thit WM, Thu SWYM, Kaewkungwal J, et al. User acceptance of electronic medical record system: implementation at Marie Stopes International, Myanmar. *Health Inform Res*. 2020;26(3):185–192. doi:10.4258/hir.2020.26.3.185
30. Kalayou MH, Endehabtu BF, Tilahun B. The applicability of the modified technology acceptance model (Tam) on the sustainable adoption of eHealth systems in resource-limited settings. *J Multidiscip Healthc*. 2020;Volume 13:1827–1837. doi:10.2147/JMDH.S284973
31. El Mahalli A. Adoption and barriers to adoption of electronic health records by nurses in three governmental hospitals in Eastern Province, Saudi Arabia. *Perspect Heal Inf Manag*. 2015;12:1f.
32. Chhetri A, Iversen M, Jens Kaasbøll CK. Evaluating mHealth apps using affordances: case of commcare versus DHIS2 tracker. 15th International Conference on Social Implications of Computers in Developing Countries (ICT4D); 2019.
33. Biruk S, Yilma T, Andualem M, Tilahun B. Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: a cross sectional study. *BMC Med Inform Decis Mak*. 2014;14(1). doi:10.1186/s12911-014-0115-5
34. Edo OC, Ang D, Etu EE, Tenebe I, Edo S, Diekola OA. Why do healthcare workers adopt digital health technologies - A cross-sectional study integrating the TAM and UTAUT model in a developing economy. *Int J Inf Manag Data Insights*. 2023;3:100186.

35. El Mahalli A. Electronic health records: use and barriers among physicians in eastern province of Saudi Arabia. *Saudi J Heal Sci.* **2015**;4(1):32. doi:10.4103/2278-0521.151407
36. Lakbala P, Lakbala M, Inaloo KD. Factors affecting electronic medical record acceptance by specialist physicians. *Lect Notes Inf Theory.* **2015**;2(4). doi:10.12720/Init.2.4.316-321
37. Walle AD, Ferede TA, Baykemagn ND, et al. Predicting healthcare professionals' acceptance towards electronic personal health record systems in a resource-limited setting: using modified technology acceptance model. *BMJ Heal Care Informat.* **2023**;30(1):e100707. doi:10.1136/bmjhci-2022-100707
38. Zayyad MA, Toycan M. Factors affecting sustainable adoption of e-health technology in developing countries: an exploratory survey of Nigerian hospitals from the perspective of healthcare professionals. *PeerJ.* **2018**;6:e4436.
39. Faida EW, Supriyanto S, Haksama S, Markam H, Ali A. The acceptance and use of electronic medical records in developing countries within the unified theory of acceptance and use of technology framework. *Open Access Maced J Med Sci.* **2022**;10(E):326–336. doi:10.3889/oamjms.2022.8409
40. Shiferaw KB, Mehari EA. Modeling predictors of acceptance and use of electronic medical record system in a resource limited setting: using modified UTAUT model. *Informat Med Unlocked.* **2019**;17:100182. doi:10.1016/j.imu.2019.100182
41. Wang C, Qi H. Influencing factors of acceptance and use behavior of mobile health application users: systematic review. *Healthc.* **2021**;9:357.
42. Jimma BL, Enyew DB. Barriers to the acceptance of electronic medical records from the perspective of physicians and nurses: a scoping review. *Inf Med Unlocked.* **2022**;31:100991. doi:10.1016/j.imu.2022.100991

Journal of Multidisciplinary Healthcare

Publish your work in this journal

The Journal of Multidisciplinary Healthcare is an international, peer-reviewed open-access journal that aims to represent and publish research in healthcare areas delivered by practitioners of different disciplines. This includes studies and reviews conducted by multidisciplinary teams as well as research which evaluates the results or conduct of such teams or healthcare processes in general. The journal covers a very wide range of areas and welcomes submissions from practitioners at all levels, from all over the world. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/journal-of-multidisciplinary-healthcare-journal>

Dovepress
Taylor & Francis Group