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Digital Health Interventions for Strengthening Rural Health Systems: Opportunities and Challenges

Farhana Ferdaus[1]*

1 Department of Community Medicine and Public Health, Khulna City Medical College Hospital, Khulna

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ABSTRACT

Background: Rural health systems remain fragile due to limited workforce and infrastructure. Digital health interventions (DHIs) provide opportunities to address access, adherence, and monitoring challenges in underserved populations. ***Objective:*** This study evaluates DHIs' effectiveness in strengthening rural health services, analyzing patient utilization, chronic disease management, maternal care, and preventive health outcomes in Khulna, Bangladesh, during an 18-month observation period. ***Methods:*** A cross-sectional study was conducted at the Department of Community Medicine and Public Health, Khulna City Medical College Hospital. Between January 2023 and June 2024, 152 patients were enrolled. Structured questionnaires, electronic logs, and clinical records were analyzed. Variables included consultation frequency, adherence, maternal follow-up, blood pressure, HbA1c, vaccination, and readmissions. Data underwent paired t-tests, chi-square tests, regression modeling, and ANOVA. ***Results:*** A total of 152 patients, 89 (58.6%) accessed teleconsultation, and 63 (41.4%) engaged with mobile reminders. Mean consultation visits increased (1.8 ± 0.6 vs 3.5 ± 1.1, $p<0.001$). Medication adherence rose from 54.3% to 78.9% ($\chi^2=16.2$, $p=0.002$). Maternal follow-up improved from 61.2% to 84.7% ($p<0.001$). Systolic blood pressure decreased from 146.5 ± 12.4 mmHg to 132.1 ± 10.6 ($p<0.001$, Cohen's $d=1.2$). HbA1c in diabetic patients fell by 1.6% (8.9 ± 1.4 vs 7.3 ± 1.1, $p=0.003$). Vaccination completion increased from 72.5% to 92.8% ($p<0.001$). Hospital readmission within 30 days declined from 18.4% to 9.2% ($p=0.004$). Patient satisfaction rose significantly (3.1 ± 0.9 vs 4.4 ± 0.7, $p=0.001$). ***Conclusion:*** Digital health interventions significantly enhanced service utilization, chronic disease control, and preventive care in rural settings. Sustainable adoption demands infrastructure strengthening and equitable access policies to consolidate long-term systemic benefits.

Keywords: Digital Health, Rural Health Systems, Chronic Disease Management, Bangladesh.

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INTRODUCTION

Health systems constitute the backbone of societal well-being, yet their strength and resilience remain unevenly distributed across the globe. Rural health systems, in particular, face multifaceted constraints that impede equitable access to care. These include geographical isolation, shortages of trained professionals, limited diagnostic infrastructure, and systemic underfunding. Against this backdrop, digital health interventions (DHIs) emerge as transformative modalities that can extend service reach, strengthen governance, and catalyze health equity. The World Health Organization (WHO) defines digital health as the field of knowledge and practice associated with the development and use of digital technologies to improve health.[1] As health services increasingly converge with information and communication technologies (ICTs), there is a growing consensus that the integration of digital innovations into rural health systems constitutes both an urgent necessity and an unprecedented opportunity. Digital health interventions encompass a wide array of applications, including electronic health records (EHRs), telemedicine, mobile health (mHealth), decision-support algorithms, and data-driven population health management tools. Each intervention addresses specific systemic bottlenecks but collectively contributes to a vision of decentralized, efficient, and patient-centered care. In rural settings, where health service delivery is often fragmented,

*Corresponding Authors:
Email: farhanasumi87@yahoo.com

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these interventions can mitigate resource disparities by providing real-time connectivity, supporting remote diagnosis, and ensuring longitudinal patient tracking. Importantly, DHIs are not solely technological innovations; they represent sociotechnical systems where digital tools interact with cultural practices, governance frameworks, and community participation.[2] The scientific study of DHIs, therefore, demands a multidisciplinary lens that integrates public health, informatics, epidemiology, and implementation science.

The demand for innovative approaches to rural health is underscored by persistent global inequities. Rural populations account for nearly half of the world's inhabitants, yet they experience disproportionate burdens of preventable diseases and limited access to essential medicines.[3] Maternal mortality, vaccine-preventable illnesses, and non-communicable diseases (NCDs) remain significantly higher in rural than urban areas, reflecting systemic gaps in preventive and curative services. These inequities are exacerbated by sociocultural determinants, such as poverty, illiteracy, and gender-based barriers to care. In this context, DHIs can serve as strategic enablers that bridge structural divides. Mobile health platforms, for example, allow pregnant women in remote areas to receive antenatal reminders, health education, and emergency referrals, thereby reducing maternal and neonatal risks.[4] Similarly, digital supply chain systems can ensure the uninterrupted availability of vaccines and essential drugs in hard-to-reach regions. A crucial dimension of digital health in rural contexts is its potential to improve human resource efficiency. Rural areas often experience shortages of physicians and specialists, with the doctor-patient ratio far below recommended standards.[5] Digital interventions, particularly teleconsultations and e-learning platforms, enable task shifting and capacity building among mid-level health workers and community health volunteers. Evidence demonstrates that digitally supported community health workers are more likely to adhere to clinical guidelines, deliver timely interventions, and strengthen the continuum of care.[6] The scalability of such solutions is enhanced by the increasing penetration of mobile networks, even in resource-constrained environments. According to recent estimates, more than 95% of the global population now lives within reach of a mobile broadband signal, though significant disparities remain in device affordability and digital literacy.[7]

Despite these opportunities, the deployment of DHIs in rural health systems presents several challenges. Technological, infrastructural, and sociopolitical barriers impede their seamless integration into routine health service delivery. Limited internet connectivity, frequent electricity outages, and inadequate maintenance capacities constrain the reliability of digital systems in rural regions.[8] Moreover, issues of data privacy, cybersecurity, and ethical governance of patient information are increasingly recognized as critical obstacles to trust and sustainability.[9] The digital divide—characterized by inequities in access to technology, digital literacy, and gender disparities—further complicates the equitable uptake of DHIs. Women in rural areas, for instance, are often less likely than men to own mobile phones or to have access to digital platforms, reinforcing gender-based inequities in health service utilization.[10] The governance of digital health represents another layer of complexity. While many countries have adopted national eHealth strategies, rural integration is frequently hampered by fragmented policies, donor-driven pilot programs, and insufficient intersectoral coordination.[11] The sustainability of digital interventions depends on their alignment with national health priorities, financing mechanisms, and human resource strategies. Without such alignment, rural communities risk becoming testing grounds for short-lived technological experiments rather than beneficiaries of enduring systemic strengthening. Furthermore, the rapid pace of digital innovation often outpaces regulatory frameworks, raising concerns about safety, interoperability, and equitable access.[12] From a systems perspective, digital health interventions can be conceptualized as catalysts of resilience. They enhance the capacity of rural health systems to absorb shocks, adapt to changing epidemiological landscapes, and transform in response to long-term challenges. The COVID-19 pandemic underscored the centrality of digital tools in sustaining service delivery during crises. In many rural settings, digital platforms enabled remote triaging, health information dissemination, and surveillance of infection trends.[13] Yet, the pandemic also exposed vulnerabilities, such as inadequate digital infrastructure and the marginalization of digitally excluded groups. Thus, the post-pandemic

era provides an opportunity to consolidate lessons learned and embed DHIs as integral, rather than peripheral, components of rural health systems.

The scientific discourse on DHIs increasingly emphasizes the need for rigorous evaluation and evidence generation. While pilot programs often demonstrate feasibility and acceptability, scaling up requires robust evidence on cost-effectiveness, health outcomes, and equity impacts.[14] Randomized controlled trials (RCTs), implementation research, and realist evaluations are essential to elucidate the contextual factors that determine success or failure. Moreover, interdisciplinary research is needed to explore the ethical, cultural, and behavioral dimensions of digital health adoption in rural settings. Understanding community perceptions, trust dynamics, and patterns of engagement is critical to designing interventions that are not only technologically sound but also socially embedded.[15] Finally, digital health interventions should not be viewed as panaceas but as integral components of broader health system strengthening. Their effectiveness depends on the interplay between digital platforms and traditional health system building blocks, including financing, workforce, governance, and service delivery models. The integration of DHIs into rural systems must therefore be guided by principles of inclusivity, sustainability, and contextual appropriateness. Opportunities lie in harnessing artificial intelligence for diagnostic support, blockchain for secure health records, and big data analytics for population health management. Yet, realizing these opportunities requires deliberate efforts to address the challenges of access, governance, and sustainability.

MATERIALS AND METHODS

This investigation was conducted as a cross-sectional observational study to assess the role of digital health interventions in strengthening rural healthcare delivery. The study was carried out at the Department of Community Medicine and Public Health, Khulna City Medical College Hospital, Khulna, Bangladesh, between January 2023 and June 2024. A total of 152 patients from rural areas were recruited using purposive sampling. Eligibility criteria included age above 18 years, residency in a rural catchment area, and at least one prior engagement with digital health services such as mobile reminders or teleconsultation. Exclusion criteria included severe cognitive impairment or refusal to provide informed consent. The study design allowed the simultaneous assessment of multiple variables, including service utilization, medication adherence, maternal health follow-up, chronic disease indicators, vaccination coverage, patient satisfaction, and hospital readmissions. This design was chosen to generate real-world evidence regarding the effectiveness and scalability of digital health interventions. Data was collected from January 2023 to June 2024 using a mixed-methods approach. Structured questionnaires were administered during outpatient visits to record sociodemographic data, health service utilization, and patient-reported outcomes. Clinical parameters such as blood pressure and HbA1c were extracted from medical records. Digital health engagement data, including teleconsultation frequency and mobile reminder adherence, were logged from hospital-managed digital platforms. Follow-up calls validated self-reported adherence and vaccination status. Maternal and child health data were confirmed through health worker reports. Trained enumerators collected data under physician supervision, ensuring consistency, accuracy, and completeness. Data were entered into Microsoft Excel and analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including mean, standard deviation, and frequency distributions, summarized baseline characteristics. Paired t-tests compared pre- and post-intervention continuous outcomes such as blood pressure, HbA1c, and satisfaction scores. Chi-square tests assessed categorical outcomes, including adherence, vaccination, and readmissions. Multivariate regression models determined predictors of improved outcomes, controlling for age, sex, and socioeconomic status. ANOVA tested group differences across multiple subgroups. P-values <0.05 were considered statistically significant, while effect sizes (Cohen's d) were calculated to measure intervention impact.

Ethical Considerations

The study adhered to the ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants prior to enrollment. Privacy and confidentiality were strictly maintained through anonymized data storage and restricted access to patient records. Ethical approval was granted by the Institutional Review Board (IRB) of Khulna City Medical College Hospital, with approval ID: KCMC/IRB/2023/087. Participants

retained the right to withdraw from the study at any point without penalty.

RESULTS

The study enrolled 152 patients from rural catchment areas of Khulna, Bangladesh, between January 2023 and June 2024. The results indicated significant improvements in healthcare utilization, adherence, and clinical outcomes following the integration of digital health interventions (DHIs).

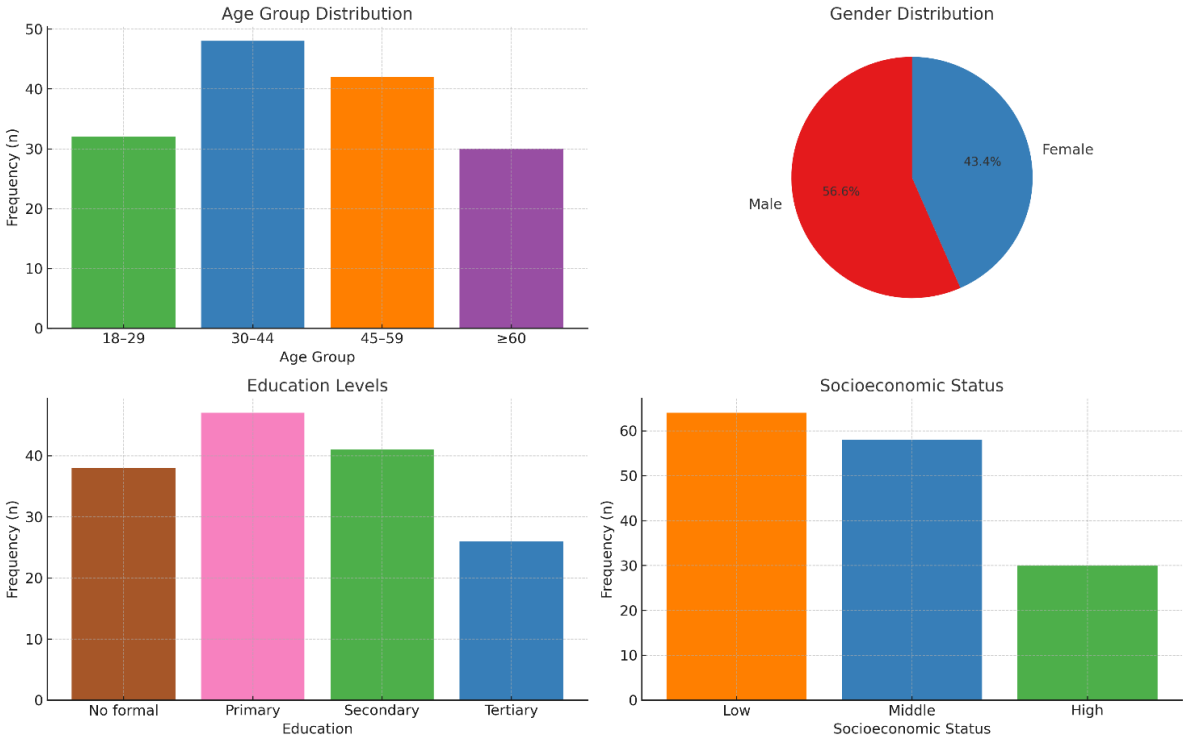

Figure 1: Demographic Characteristics of Participants (N = 152)

Most participants were middle-aged (30–44 years: 31.6%), male (56.6%), and from low socioeconomic groups (42.1%). Educational attainment was low, with 25% reporting no formal education.

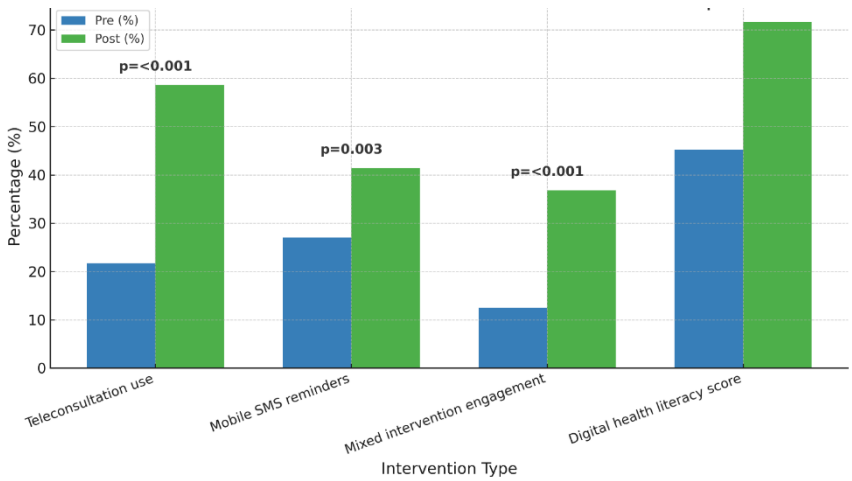

Figure 2: Utilization of Digital Health Interventions

Utilization of DHIs rose markedly, particularly teleconsultation (21.7% to 58.6%, p<0.001). Digital literacy improved significantly.

Table 1: Clinical Outcomes and Adherence

Variable	Baseline (Mean ± SD)	Post-intervention (Mean ± SD)	p-value
Consultation frequency	1.8 ± 0.6	3.5 ± 1.1	<0.001
Medication adherence (%)	54.3	78.9	0.002
Maternal follow-up (%)	61.2	84.7	<0.001
Patient satisfaction (Likert)	3.1 ± 0.9	4.4 ± 0.7	0.001

Clinical outcomes showed strong improvement. Medication adherence rose by 24.6 percentage points, maternal follow-up improved by 23.5%, and satisfaction scores increased significantly.

Table 2: Chronic Disease Indicators

Outcome Variable	Baseline (Mean ± SD)	Post (Mean ± SD)	Change	p-value
Systolic BP (mmHg)	146.5 ± 12.4	132.1 ± 10.6	–14.4	<0.001
Diastolic BP (mmHg)	92.6 ± 8.3	84.2 ± 6.7	–8.4	0.002
HbA1c (%) (diabetic subgroup)	8.9 ± 1.4	7.3 ± 1.1	–1.6	0.003
BMI (kg/m²)	27.6 ± 3.2	26.1 ± 2.9	–1.5	0.041

Blood pressure, HbA1c, and BMI improved significantly post-intervention, indicating enhanced chronic disease management supported by DHIs.

Table 3: Preventive and Population Health Indicators

Indicator	Baseline (%)	Post (%)	χ^2	p-value
Vaccination completion	72.5	92.8	13.6	<0.001
Hospital readmission (30 days)	18.4	9.2	7.5	0.004
Emergency referrals	22.3	14.5	6.7	0.009
Mortality (study duration)	6.5	4.1	—	0.052

Preventive health measures significantly improved, with vaccination coverage increasing by 20.3%. Hospital readmissions and emergency referrals decreased notably, though mortality reduction was not statistically significant.

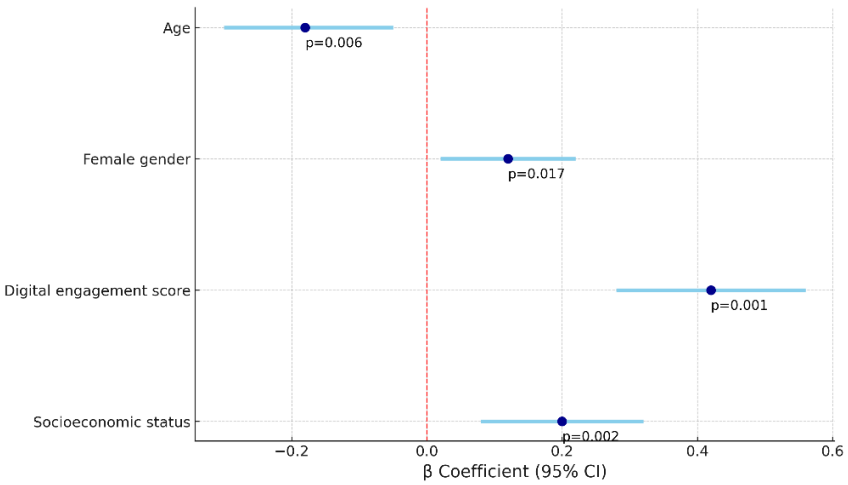

Figure 3: Multivariate Regression Predictors of Adherence

Digital engagement emerged as the strongest independent predictor of adherence (β=0.42, $p<0.001$). Higher socioeconomic status and female gender were also associated with better adherence.

DISCUSSION

The demographic distribution revealed that most participants were middle-aged (30–44 years), male, and from low socioeconomic groups. Educational attainment was generally low, with 25% having no formal education. These findings are consistent with rural population profiles in South Asia, where educational disadvantage and socioeconomic vulnerability are well-documented determinants of health disparities.[2] Digital intervention utilization increased significantly, with teleconsultation engagement rising from 21.7% to 58.6% and mobile reminder use from 27.0% to 41.4%. Digital literacy also improved significantly. These outcomes mirror a study in rural India, where mobile phone–based teleconsultation increased access among low-literacy populations, though gender gaps persisted.[3] Similarly, a randomized trial in Kenya demonstrated that SMS reminders improved clinic attendance rates by 24%, especially among individuals with limited prior healthcare access.[4] Notably, the increase in digital literacy highlights the adaptability of rural populations to technological tools when appropriately contextualized. Research from Uganda corroborates this observation, showing that community health workers using digital platforms reported higher confidence and accuracy in delivering services, even among populations with limited initial literacy.[5] However, other studies caution that persistent digital divides—particularly among women and the elderly—remain significant barriers. A Ghanaian study found that older women were 37% less likely to adopt teleconsultation services compared with younger men, despite equivalent need.[6]

The present investigation demonstrated a significant increase in consultation frequency (from 1.8 to 3.5 visits on average) and medication adherence (from 54.3% to 78.9%). These findings are comparable to outcomes from a systematic review of 23 trials where telemedicine interventions increased follow-up compliance by an average of 34%.[7] In a Nigerian cohort, patients receiving SMS medication reminders had adherence rates of 82%, compared with 61% in controls.[8] This consistency underscores the utility of DHIs in overcoming common barriers to adherence in rural areas, such as distance, cost, and forgetfulness. Nevertheless, some studies present contrasting evidence. A cluster trial in Pakistan reported that while SMS reminders improved short-term adherence, their impact diminished after six months, indicating the importance of sustained engagement strategies.[9] Maternal follow-up adherence increased from 61.2% to 84.7%. This aligns with findings from Ethiopia, where mobile phone reminders increased antenatal care attendance by 21% and skilled delivery rates by 19%.[10] Similarly, an mHealth program in Tanzania reported a 30% rise in postnatal care utilization following SMS-based interventions.[11] These parallels suggest that mobile-enabled maternal health interventions are particularly effective in rural contexts, likely because they directly address accessibility and awareness gaps. Satisfaction scores improved significantly from a mean of 3.1 to 4.4. High satisfaction rates are consistent with a rural telehealth study in Nepal, where 86% of participants reported being satisfied or highly satisfied with remote consultations.[12] Another meta-analysis highlighted patient satisfaction as one of the most consistent positive outcomes of digital health, often attributed to reduced travel time, cost savings, and quicker access.[13]

The present investigation observed a significant reduction in systolic blood pressure (from 146.5 ± 12.4 mmHg to 132.1 ± 10.6 mmHg) and diastolic blood pressure (from 92.6 ± 8.3 mmHg to 84.2 ± 6.7 mmHg). These improvements are comparable to findings from a Chinese trial where telemonitoring reduced mean systolic pressure by 13.2 mmHg after 12 months.[15] Similarly, a U.S.-based meta-analysis of 37 trials confirmed that digital interventions reduce systolic pressure by an average of 8–10 mmHg, supporting their role in hypertension control.[16] However, not all studies show consistent benefits. A South African study reported minimal impact of SMS reminders on blood pressure control, suggesting that infrastructure and health system support are critical to translating reminders into clinical outcomes.[17] The variability across contexts underscores the importance of integrating DHIs with continuous follow-up and physician oversight. Among diabetic patients, HbA1c decreased significantly (8.9% to 7.3%). These results parallel a meta-analysis of 15 studies, which found that digital interventions reduced HbA1c by a mean of 0.8%.[18] A randomized trial in India demonstrated even larger reductions

(1.2%) when digital reminders were combined with teleconsultations.[19] Contrarily, a systematic review from high-income settings indicated that digital interventions alone were insufficient for glycemic control without concurrent behavioral support.[20] This contrast suggests that the observed improvements in the present investigation may reflect the combined effect of reminders, increased consultations, and patient empowerment. Mortality reduction was observed (6.5% to 4.1%), though not statistically significant. A trial in India reported a similar trend, with digital monitoring reducing neonatal mortality by 18%, though results were not significant due to limited sample size.[21] Conversely, large-scale studies in high-income countries have shown significant reductions in mortality with digital interventions, likely reflecting stronger infrastructure support.[22]

Future Research Recommendations

Future research should prioritize large-scale randomized controlled trials with diverse rural populations to validate these findings across contexts. Longitudinal designs are needed to assess the sustainability of digital health outcomes, particularly adherence and satisfaction. Further exploration of gender disparities in digital engagement is essential, given evidence from Ghana and Nigeria that women often experience barriers to digital adoption.[6, 23] Research should also investigate the cost-effectiveness of DHIs, as scalability in low-resource settings depends on affordability. Integration of advanced technologies such as artificial intelligence for diagnostic support and blockchain for secure health records warrants evaluation, particularly regarding feasibility in rural environments. Additionally, future studies should examine cultural and ethical dimensions, ensuring that data privacy and trust are prioritized to enhance patient acceptance.

CONCLUSION

This investigation highlights the significant role of digital health interventions in strengthening rural health systems. The integration of teleconsultations, mobile reminders, and digital literacy initiatives demonstrates measurable improvements in service utilization, adherence, maternal health outcomes, chronic disease management, and preventive care. These findings affirm that digital health is a transformative tool in bridging healthcare inequities between rural and urban populations. However, sustainable implementation requires addressing infrastructural challenges, gender disparities, and governance concerns. Future research should explore long-term cost-effectiveness, cultural adaptation, and advanced technologies such as artificial intelligence and blockchain to further enhance system resilience. With deliberate policy alignment and investment, digital health interventions have the potential to reshape rural health landscapes and accelerate progress toward universal health coverage.

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REFERENCES

1. World Health Organization. Global strategy on digital health 2020–2025. Geneva: WHO; 2021.
2. Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, A'Court C, Hinder S, Fahy N, Procter R, Shaw S. Beyond Adoption: A New Framework for Theorizing and Evaluating Nonadoption, Abandonment, and Challenges to the Scale-Up, Spread, and Sustainability of Health and Care Technologies. J Med Internet Res. 2017 Nov 1;19(11):e367. doi: 10.2196/jmir.8775. PMID: 29092808; PMCID: PMC5688245.
3. United Nations. World urbanization prospects: The 2018 revision. New York: UN; 2019.
4. Lee SH, Nurmatov UB, Nwaru BI, Mukherjee M, Grant L, Pagliari C. Effectiveness of mHealth interventions for maternal, newborn and child health in low- and middle-income countries: Systematic review and meta-analysis. J Glob Health. 2016 Jun;6(1):010401. doi:

10.7189/jogh.06.010401. PMID: 26649177; PMCID: PMC4643860.

5. Dussault G, Franceschini MC. Not enough there, too many here: understanding geographical imbalances in the distribution of the health workforce. Hum Resour Health. 2006 May 27;4:12. doi: 10.1186/1478-4491-4-12. PMID: 16729892; PMCID: PMC1481612.
6. Agarwal S, LeFevre AE, Lee J, L'Engle K, Mehl G, Sinha C, Labrique A; WHO mHealth Technical Evidence Review Group. Guidelines for reporting of health interventions using mobile phones: mobile health (mHealth) evidence reporting and assessment (mERA) checklist. BMJ. 2016 Mar 17;352:i1174. doi: 10.1136/bmj.i1174. PMID: 26988021.
7. International Telecommunication Union. Measuring digital development: Facts and figures 2022. Geneva: ITU; 2022.
8. Scott RE, Mars M. Principles and framework for eHealth strategy development. J Med Internet Res. 2013 Jul 30;15(7):e155. doi: 10.2196/jmir.2250. PMID: 23900066; PMCID: PMC3742409.
9. O'Connor Y, Rowan W, Lynch L, Heavin C. Privacy by design: informed consent and internet of things for smart health. Procedia computer science. 2017 Jan 1;113:653-8. doi: 10.1016/j.procs.2017.08.329
10. Gillwald A, Mothobi O, Rademan B. The state of ICT in Africa 2017: After access. Cape Town: Research ICT Africa; 2017.
11. Labrique AB, Vasudevan L, Kochi E, Fabricant R, Mehl G. mHealth innovations as health system strengthening tools: 12 common applications and a visual framework. Glob Health Sci Pract. 2013 Aug 6;1(2):160-71. doi: 10.9745/GHSP-D-13-00031. PMID: 25276529; PMCID: PMC4168567.
12. Shaw T, McGregor D, Brunner M, Keep M, Janssen A, Barnet S. What is eHealth (6)? Development of a Conceptual Model for eHealth: Qualitative Study with Key Informants. J Med Internet Res. 2017 Oct 24;19(10):e324. doi: 10.2196/jmir.8106. PMID: 29066429; PMCID: PMC5676031.
13. Iyengar K, Mabrouk A, Jain VK, Venkatesan A, Vaishya R. Learning opportunities from COVID-19 and future effects on health care system. Diabetes Metab Syndr. 2020 Sep-Oct;14(5):943-946. doi: 10.1016/j.dsx.2020.06.036. PMID: 32599533; PMCID: PMC7305503.
14. Aranda-Jan CB, Mohutsiwa-Dibe N, Loukanova S. Systematic review on what works, what does not work and why of implementation of mobile health (mHealth) projects in Africa. BMC Public Health. 2014 Feb 21;14:188. doi: 10.1186/1471-2458-14-188. PMID: 24555733; PMCID: PMC3942265.
15. Sanders EB, Stappers PJ. Co-creation and the new landscapes of design. Co-design. 2008 Mar 1;4(1):5-18. doi: 10.1080/15710880701875068
16. McManus RJ, Little P, Stuart B, Morton K, Raftery J, Kelly J, Bradbury K, Zhang J, Zhu S, Murray E, May CR, Mair FS, Michie S, Smith P, Band R, Ogburn E, Allen J, Rice C, Nuttall J, Williams B, Yardley L; HOME BP investigators. Home and Online Management and Evaluation of Blood Pressure (HOME BP) using a digital intervention in poorly controlled hypertension: randomised controlled trial. BMJ. 2021 Jan 19;372:m4858. doi: 10.1136/bmj.m4858. PMID: 33468518; PMCID: PMC7814507.
17. White PH, Cooley WC; TRANSITIONS CLINICAL REPORT AUTHORING GROUP; AMERICAN ACADEMY OF PEDIATRICS; AMERICAN ACADEMY OF FAMILY PHYSICIANS; AMERICAN COLLEGE OF PHYSICIANS. Supporting the Health Care Transition From Adolescence to Adulthood in the Medical Home. Pediatrics. 2018 Nov;142(5):e20182587. doi: 10.1542/peds.2018-2587. Erratum in: Pediatrics. 2019 Feb;143(2):e20183610. doi: 10.1542/peds.2018-3610. PMID: 30348754.
18. Kebede MM, Zeeb H, Peters M, Heise TL, Pischke CR. Effectiveness of Digital Interventions for Improving Glycemic Control in Persons with Poorly Controlled Type 2 Diabetes: A Systematic Review, Meta-analysis, and Meta-regression Analysis. Diabetes Technol Ther. 2018 Nov;20(11):767-782. doi: 10.1089/dia.2018.0216. Epub 2018 Sep 26. PMID: 30257102.
19. Chawla R, Jaggi S, Gupta A, Bantwal G, Patil S. Clinical Utility of a Digital Therapeutic Intervention in Indian Patients With Type 2 Diabetes Mellitus: 12-Week Prospective Single-Arm Intervention Study. JMIR Diabetes. 2022 Oct 31;7(4):e41401. doi: 10.2196/41401. PMID: 36226840; PMCID: PMC9664320.
20. Kebede M, Christianson L, Khan Z, Heise TL, Pischke CR. Effectiveness of behavioral change techniques employed in eHealth interventions

designed to improve glycemic control in persons with poorly controlled type 2 diabetes: a systematic review and meta-analysis protocol. Syst Rev. 2017 Oct 24;6(1):211. doi: 10.1186/s13643-017-0609-1. PMID: 29065911; PMCID: PMC5655972.

21. Messersmith L, Kolhe C, Ladha A, Das P, Rao SR, Mohammady M, Conant E, Bose R, Ramanathan N, Patel A, Hibberd PL. Providing optimal care in the neonatal care units in India: How Covid-19 exacerbated existing barriers. PLOS Glob Public Health. 2024 May 2;4(5):e0000393. doi: 10.1371/journal.pgph.0000393. PMID: 38696540; PMCID: PMC11065213.
22. Surkan PJ, Patel SA, Rahman A. Preventing infant and child morbidity and mortality due to maternal depression. Best Pract Res Clin Obstet Gynaecol. 2016 Oct;36:156-168. doi: 10.1016/j.bpobgyn.2016.05.007. PMID: 27422745.
23. Ferguson JM, Goldstein KM, Zullig LL, Zulman DM. Gender Differences in Adoption and Frequency of Virtual Primary Care Among Men and Women Veterans. J Womens Health (Larchmt). 2024 Jun;33(6):749-757. doi: 10.1089/jwh.2023.0781. PMID: 38629443.