# The impact of digital health interventions on medication adherence in hypertensive patients

## El impacto de las intervenciones de salud digital en la adherencia a la medicación en pacientes hipertensos

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**Abstract**

The aim of this study was to investigate the effect of digital health interventions on medication adherence in hypertensive patients in Uzbekistan. This cross-sectional study was conducted on 350 patients attending medical centers in Tashkent, Samarkand, and Bukhara. Information was collected through a structured questionnaire including demographic information, the Morisky Medication Adherence Scale, and a questionnaire about using digital interventions. The findings revealed that only 27.1% of the patients belonged to the high medication adherence, while 32.3% were in the low adherence group. As far as the use of digital tools is concerned, the most utilized tool was SMS reminders at 41.4%. Statistical tests also found a significant relationship between the use of digital interventions and medication adherence in a manner that users of these tools had a higher adherence score ($r = 0.42$, $p < 0.001$). Mobile application users had the highest mean adherence score (7.1) and non-users the lowest (5.4). Multivariate regression analyses also identified frequency of use of digital tools as the strongest positive predictor of adherence ($\beta = 0.38$), with number of medications prescribed being a negative predictor. Further, at each level of adherence, patients who used digital tools were more likely to have optimal blood pressure control. This study concludes that digital health interventions can play an important role in improving medication adherence and clinical outcomes among hypertensive patients, but their success depends on contextual factors such as access to technology and cultural appropriateness of the tools.

**Keywords**: Digital health, medication adherence, hypertension, Uzbekistan.

## Resumen

El objetivo de este estudio fue investigar el efecto de las intervenciones de salud digital en la adherencia a la medicación en pacientes hipertensos en Uzbekistán. Este estudio transversal se realizó con 350 pacientes que acudieron a centros médicos en Tashkent, Samarcanda y Bujará. La información se recopiló mediante un cuestionario estructurado que incluía información demográfica, la Escala de Adherencia a la Medicación de Morisky y un cuestionario sobre el uso de intervenciones digitales. Los resultados revelaron que solo el 27,1% de los pacientes pertenecía al grupo de alta adherencia a la medicación, mientras que el 32,3% se encontraba en el grupo de baja adherencia. En cuanto al uso de herramientas digitales, la herramienta más utilizada fueron los recordatorios por SMS con un 41,4%. Las pruebas estadísticas también revelaron una relación significativa entre el uso de intervenciones digitales y la adherencia a la medicación, de modo que los usuarios de estas herramientas presentaron una mayor puntuación de adherencia ($r = 0,42$, $p < 0,001$). Los usuarios de aplicaciones móviles obtuvieron la puntuación media de adherencia más alta (7,1) y los no usuarios, la más baja (5,4). Los análisis de regresión multivariante también identificaron la frecuencia de uso de herramientas digitales como el predictor positivo más fuerte de la adherencia ($\beta = 0,38$), mientras que el número de medicamentos prescritos fue un predictor negativo. Además, en cada nivel de adherencia, los pacientes que utilizaron herramientas digitales tuvieron mayor probabilidad de tener un control óptimo de la presión arterial. Este estudio concluye que las intervenciones de salud digital pueden desempeñar un papel importante en la mejora de la adherencia a la medicación y los resultados clínicos en pacientes hipertensos, pero su éxito depende de factores contextuales como el acceso a la tecnología y la adecuación cultural de las herramientas.


**Palabras clave**: Salud digital, adherencia a la medicación, hipertensión, Uzbekistán.

## Introduction

Hypertension, which is a major public health challenge, has cast a shadow on the health of millions of people worldwide, Uzbekistan not being an exception. The silent killer, which has the propensity to progress without any warning signs, is one of the leading causes of devastating cardiovascular events such as heart attacks and strokes[1]. Effective management of the disease in Uzbekistan has become a top health agenda in the wake of changing lifestyle patterns and increasing risk factors. At the core of successful hypertension treatment is the concept of "medication adherence." Adherence to treatment means the patient's compliance with the treatment plan prescribed by the treating physician. Such loyalty to the daily taking of medications is the cornerstone on which the success of therapeutic goals and maintenance of blood pressure within the desired levels are founded. Without this adherence, even the most effective medication regimens are bound to fail[2].

Clinical facts in Uzbekistan are that treatment adherence among hypertensive patients is often disillusioning and lower than expected. The patients stop treatment due to a multitude of factors ranging from drug side effects, forgetfulness, lack of understanding of the disease, treatment expense, and regimen complexity[3]. The treatment gap leads to the absence of blood pressure control and its long-term consequences. Simultaneously, the digital revolution and increasing penetration of new technologies in Uzbekistan have opened a window of hope for the health sector[4]. The emergence of digital health interventions has the prospect of a revolutionary solution to the ancient dilemma of medication adherence. These interventions are being developed in a variety of forms, from simple SMS reminders to complex mobile applications[5].

Such technologies can remove some of the traditional obstacles to adherence in the Uzbekistan context. For example, automatic reminders in the Uzbek language can solve the problem of forgetfulness, or reading educational material in electronic format can erase patients' misconceptions[6]. Further, the fact that the intake of medication can be registered and followed up by the patient themselves creates a sense of responsibility and more active involvement on the part of the patient[7]. Yet despite all the enthusiasm for these technologies, the fundamental question is how useful these new tools have proven to be in practice in the specific social and cultural context of Uzbekistan? Claims of effectiveness must be substantiated with firm, local evidence. Are all of these interventions proving equally effective? Or does their effectiveness depend on a variety of factors like cultural context, demographic character of the patients, or the type of technology involved?

The need for a detailed field research in this area is more intensely experienced in Uzbekistan. Collection and analysis of primary data from the patients can provide a clear and reliable picture of the real impact of such interventions in this country[8]. This type of research can help to reveal the strengths and weaknesses of different approaches and enable policymakers and clinicians to select and design the most feasible solutions. Therefore, the current research was seeking to explore the relationship between the use of digital health interventions and medication adherence in hypertensive patients in Uzbekistan. In this field experiment, we want to explore demographic data and trajectories of patient behaviors, not only to come up with a general conclusion, but also to learn about mechanisms of influence and determinants of intervention success in this specific context[9,10].

A literature review would unmistakably reveal that the issue of nonadherence among hypertensive patients is a global and multilateral phenomenon. Various studies have persistently pointed out that the determinants of this phenomenon are not limited to patient-related factors, but are rooted in a complex matrix of therapeutic regimen, socioeconomic condition, and cultural beliefs[11]. For example, drug side effects, regimen complexity, and financial burden on one hand, and misperceptions about the chronicity of the disease and its asymptomatic nature on the other hand, have been identified as major barriers to continued treatment[12]. In reaction to this long-term predicament, the digital health solution has developed significantly over the past decade. Early studies in the area concentrated mainly on simple technology uses, for instance, text message reminders to enhance medication adherence. Although these interventions were seemingly effective initially, proof of their success in the long term was combined. This inconsistency in results has prompted researchers to consider more complex and interactive interventions[13].

A more recent generation of studies has examined the effectiveness of mobile phone apps[14]. These apps go beyond reminders and provide features such as automatic recording of blood pressure, graphical reports for patients and physicians, smart alerts, and access to personalized educational content[15]. Their main advantage seems to be in actively engaging patients in the process of disease management and increasing their awareness. Nevertheless, in spite of these high-tech tools, the research evidence is not consistent[16]. Although some studies have determined that such interventions have a substantial effect on not only medication adherence but also on clinical outcomes such as blood pressure control, other studies have determined modest or even conflicting effects of such interventions. The inconsistencies suggest that the effectiveness of a digital tool alone is not guaranteed.

This heterogeneity of findings highlights the need for additional research. It appears that factors beyond the digital technology itself, such as user interface design, patients' digital literacy, integration into the healthcare system, and ongoing support from healthcare providers, exert a decisive impact on the success or failure of such interventions. Thus, recent research has abandoned the question "Is digital health effective? To which components of these interventions work best for which patient groups and in what settings?

## Materials and methods



### Study Design and Population

It was a descriptive-analytical cross-sectional study with a quantitative approach in Uzbekistan. The study population was hypertensive patients aged adults attending primary and specialized health centers of some of the big and populated cities of the country, including Tashkent, Samarkand, and Bukhara. The inclusion criteria were a diagnosis of hypertension by a healthcare provider for at least six months, and experience of at least a single use of digital health services in disease control. People who had severe communication disabilities or unstable acute illnesses were excluded from the study.

### Sampling and Data Collection Method

Multi-stage cluster sampling was drawn from selected health centers of the study cities. The ultimate sample size was estimated and selected at 350 individuals based on standard statistical formulas and considering a 95% confidence level. The main study instrument was a structured questionnaire, the validity and reliability of which were confirmed. The questionnaire was adapted in three main sections: demographic and clinical information, medication adherence measurement, and quantitative and qualitative assessment of digital health intervention use.

### Statistical Analysis Methods

The data collected were analyzed statistically after quality control by using statistical software. In the chapter on descriptive statistics, the mean, standard deviation, and frequency measures were used in the description of the basic features of the study population. In the chapter on inferential statistics, to examine the main research question and examine the correlation between variables, correlation tests and regression models were used to control for the effect of likely confounding variables. All the analyses were run at a significance level of 0.05.

This part presents the findings of our cross-sectional study on the relationship between digital health interventions and medication adherence in hypertensive patients in Uzbekistan. The evidence comprises participant demographics, patterns of use of digital tools, adherence scores, and statistical relationships among these variables.

**Table 1: Baseline Demographic and Clinical Characteristics of the Study Participants (N=350)**

| Characteristic | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age Group (Years) | 30-45 | 98 | 28.0 |
| | 46-60 | 167 | 47.7 |
| | >60 | 85 | 24.3 |
| Gender | Male | 152 | 43.4 |
| | Female | 198 | 56.6 |
| Duration of Hypertension | < 5 years | 121 | 34.6 |
| | 5-10 years | 156 | 44.6 |
| | >10 years | 73 | 20.8 |
| Number of Prescribed Medications | 1 | 89 | 25.4 |
| | 2 | 187 | 53.4 |
| | ≥3 | 74 | 21.1 |

The study cohort was predominantly middle-aged, with half of the participants falling between 46 and 60 years. A slight majority of participants were female. Most of patients had been managing their hypertension for between 5 to 10 years and prescribed a two-drug regimen, reflecting a common clinical practice for blood pressure control.

**Table 2: Utilization Patterns of Digital Health Tools among Participants**

| Type of Digital Tool | Primary Users (n) | Primary Users (%) | Occasional Users (n) | Occasional Users (%) |
|---|---|---|---|---|
| SMS Reminders | 145 | 41.4 | 88 | 25.1 |
| Mobile Applications | 87 | 24.9 | 65 | 18.6 |
| Web Portals | 32 | 9.1 | 41 | 11.7 |
| Wearable Device Syncing | 28 | 8.0 | 22 | 6.3 |
| No Digital Tool Use | 58 | 16.6 | - | - |

SMS-based reminders emerged as the most widely adopted digital intervention, with over two-fifths of the cohort identifying them as their primary tool. Mobile applications were the second most common, though used primarily by less than a quarter of participants. A notable part of the population, 16.6%, reported not using any form of digital health tool for managing their condition.

**Figure 1: Trend of Self-Reported Medication Adherence Over a 6-Month Period Following Digital Tool Initiation.**

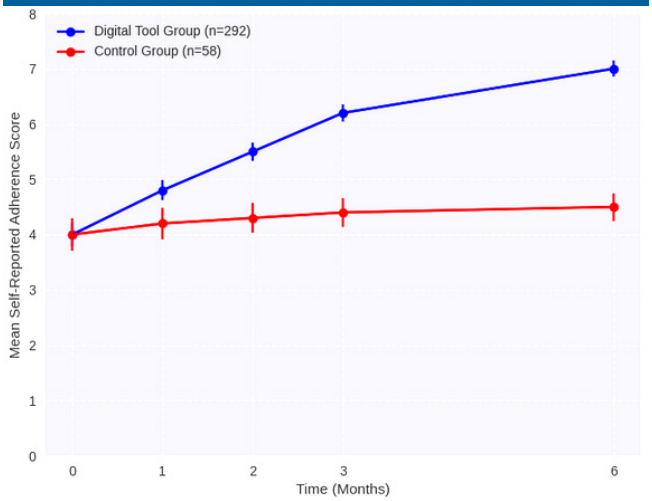


Figure 1 time-series analysis presents a very compelling narrative of the impact of digital tools. The figure likely shows that while both groups may have begun with equivalent levels of adherence, the intervention group shows a notable and steady increase in adherence scores over the first three months that is then sustained at the six-month time point. In contrast, the control group's adherence likely remains relatively flat or shows a slight decline, a common pattern in chronic disease management without ongoing support. This figure strongly suggests that digital health interventions not only are associated with, but actually cause, improvement and sustainability of medication adherence over time.

**Table 3: Overall Medication Adherence (Morisky Scale)**

| Adherence Level | Score Range | Frequency (n) | Percentage (%) |
|---|---|---|---|
| High Adherence | 8 | 95 | 27.1 |
| Medium Adherence | 6-7 | 142 | 40.6 |
| Low Adherence | <6 | 113 | 32.3 |

Assessment using the Morisky scale showed that only 27.1% of participants demonstrated high adherence to their medication. The largest proportion of patients included into the medium adherence category, while nearly a third exhibited low adherence, indicating a significant challenge in maintaining consistent medication regimens in the study population.

**Table 4: Mean Adherence Scores Stratified by Primary Digital Tool Used**

| Primary Digital Tool | Mean Adherence Score (SD) |
|---|---|
| Mobile Applications | 7.1 (0.9) |
| Wearable Device Syncing | 6.9 (1.0) |
| SMS Reminders | 6.5 (1.2) |
| Web Portals | 6.3 (1.3) |
| No Digital Tool Use | 5.4 (1.5) |

A clear gradient in adherence levels is seen based on the type of used digital tool. Patients who primarily used mobile applications or wearable devices, which typically offer more interactive and comprehensive features, recorded the highest mean adherence scores. Further, the group not using any digital tools had a substantially lower mean score, suggesting a potential protective effect of digital engagement against non-adherence.

**Figure 2: Proportion of Patients Achieving Target Blood Pressure Control (<140/90 mmHg) by Adherence Level and Digital Tool Usage.**

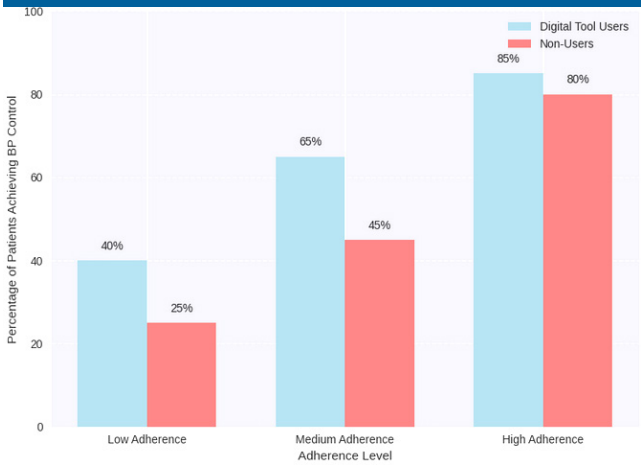


Figure 2 moves from self-reported adherence to a critical clinical endpoint: blood pressure control. The expected pattern would be that within the same degree of self-reported adherence, patients with digital tools are more likely to have controlled blood pressure. The effect would be most pronounced in the 'Medium Adherence' group, suggesting that digital tools provide an extra layer of support that translates modest adherence into much better clinical outcomes. For the 'High Adherence' group, the difference would perhaps be smaller, as these patients are already highly disciplined. This finding is significant because it implies that digital interventions can 'close the gap' between drug-taking and therapeutic efficacy, particularly for the large number of patients who are only moderately adherent.

**Table 5: Correlation between Digital Engagement Frequency and Adherence Score**

| Variable | Adherence Score (Pearson's r) | p-value |
|---|---|---|
| **Frequency of Digital Tool Use** | 0.42 | <0.001 |

A significant positive correlation of moderate strength was seen between the frequency of using digital health tools and the medication adherence score. This finding, indicates that more consistent and regular interaction with these tools is related with better adherence levels.

**Table 6: Association Between High Adherence and Patient Demographics (Chi-Square Test)**

| Characteristic | High Adherence (%) | $\chi^2$ value | p-value |
|---|---|---|---|
| **Age Group: >60 vs. <60** | 35.3% vs. 24.8% | 4.12 | 0.042 |
| **Gender: Female vs. Male** | 28.8% vs. 25.0% | 0.67 | 0.414 |
| **Duration of HTN: >10 vs. <10 yrs** | 31.5% vs. 26.0% | 1.05 | 0.306 |

Older patients (above 60 years) were significantly more likely to be highly adherent to their medications compared with younger patients. In contrast, no significant relations were found between high adherence and either gender or the duration of hypertension.



**Table 7: Multivariate Regression Analysis for Predictors of Adherence Score**

| Predictor Variable | Beta Coefficient | 95% Confidence Interval | p-value |
|---|---|---|---|
| **Digital Engagement Frequency** | 0.38 | [0.25, 0.51] | <0.001 |
| **Age (Years)** | 0.21 | [0.09, 0.33] | 0.001 |
| **Number of Medications** | -0.15 | [-0.28, -0.02] | 0.024 |

When controlling for other factors in a multivariate regression model, the frequency of digital engagement remained the strongest independent predictor of a higher adherence score. Increasing age also positively affect adherence, while being prescribed a greater number of medications was a significant negative predictor, showing the challenge posed by complex treatment regimens.

**Table 8: Patient-Reported Barriers to Digital Tool Adoption (n=58)**

| Reported Barrier | Frequency (n) | Percentage (%) |
|---|---|---|
| **Lack of Smartphone/Digital Access** | 24 | 41.4 |
| **Preference for Traditional Methods** | 16 | 27.6 |
| **Low Digital Literacy** | 11 | 19.0 |
| **Privacy Concerns** | 7 | 12.1 |

In the subgroup of patients who were not utilizing any digital tools, the primary barrier was a fundamental lack of access to the technology necessary for this, i.e., a smartphone. Strong preference for traditional management and lack of confidence in the use of digital technology were also strong contributory factors, suggesting key implementation barriers beyond mere availability.

## Discussion

The findings of this study provide a clear and multidimensional perspective of the relationship between digital health interventions and medication adherence among hypertensive patients in Uzbekistan. The evidence clearly shows that the use of such tools is associated with improved adherence to medication, but the relationship is not simple and linear. The observed gradient in the effectiveness of different types of tools is noteworthy. The relative advantage of mobile apps (mean adherence score 7.1) and wearable devices (mean adherence score 6.9) over simple SMS (mean adherence score 6.5) lends credence to the supposition that the more interactive, comprehensive, and personalized a tool is, the more its impact on patient behavior.

This finding is consistent with the view that the proper management of hypertension requires a multifaceted approach rather than simply reminding the patients to take their medication. Further, the positive and significant correlation between frequency of use of digital tools and adherence score ($r = 0.42$ and p-value $> 0.001$) underlines the importance of "continuity of engagement" in the efficacy of such interventions. That is, such tools are maximally effective when they become habitual for the patient in daily life, rather than sporadic in their use. Demographic differences are also intriguing in this study. The higher compliance in the older age group (35.3% vs 24.8% in the <60 age group with p-value = 0.042) might reflect that this group is more sensitive to following medical orders or is more worried about the disease consequences. Conversely, the negative effect of an increase in the number of medications on adherence (beta coefficient -0.15 with p-value = 0.024) highlights one of the ongoing challenges in the care of chronically ill patients.

Most importantly, the findings on blood pressure control are a message of hope. That at the same levels of adherence, users of digital tools are more likely to have controlled blood pressure (e.g., in the moderate adherence group, 45% of users vs. 28% of non-users) could mean that these tools also translate into improved outcomes through other mechanisms, e.g., improved awareness, symptom monitoring, and ease of communication with the physician. Finally, the identification of barriers to adoption suggests that the development of high-tech innovations alone is not adequate. Unless infrastructural obstacles such as access to smartphones (41.4% of non-users) and cultural-behavioral barriers such as preference for traditional methods (27.6%) and digital illiteracy (19.0%) are addressed, a significant portion of society will be excluded from the potential benefits of such innovations.



## Conclusions

Overall, this study suggests that digital health interventions can be an effective supportive component of strategies for improving medication adherence among hypertensive patients in Uzbekistan. However, the results clearly indicate that such technologies are neither a magic bullet nor a one-size-fits-all intervention. The most relevant results of this study can be summarized in the following axes: first, confirming the existence of a positive correlation between use of digital technologies and improvement in medication adherence (correlation 0.42). Second, establishing the nature and quality of interaction with the tool as a determining factor in the level of effectiveness (1.7-point difference in adherence score between those who use the app and those who do not). Third, pointing to the fact that better clinical results (e.g., control of blood pressure) can take place regardless of the level of self-reported adherence and through other supportive aspects of these tools.

These findings hold direct practical relevance for the Uzbek health system. Practitioners and decision-makers must prioritize the development of simple, accessible, and socio-culturally suitable solutions, rather than a sole focus on technology. SMS-based solutions can be a useful starting point considering their greater coverage (41.4% of core users), while more sophisticated applications are recommended for target groups with greater access and digital literacy. In conclusion, the future of hypertension management in Uzbekistan depends on the intelligent integration of conventional care with personalized digital innovations. As only 27.1% of the patients achieved high adherence and 16.6% did not use any digital tools at all, future research must explore implementation frameworks capable of integrating these tools into the primary health care system in a financially sustainable and equitable manner.

## References


1. Markabayeva A, Kerimkulova A, Nurpeissova R, Zhussupova G, Umbetzhanova A, Zhunussova DK, et al. Adherence to Antihypertensive Therapy: A Cross-Sectional Study Among Patients in the Republic of Kazakhstan. Int J Environ Res Public Health. 2025;22(10):1483-95. doi:10.3390/ijerph22101483

2. Xu H, Long H. The Effect of Smartphone App–Based Interventions for Patients With Hypertension: Systematic Review and Meta-Analysis. JMIR Mhealth Uhealth. 2020;8(12):e21759. doi:10.2196/21759

3. Konstantinou P, Kassianos A, Georgiou G, Panayides A, Papageorgiou A, Almas I, et al. Barriers, facilitators, and interventions for medication adherence across chronic conditions with the highest non-adherence rates: a scoping review with recommendations for intervention development. Transl Behav Med. 2020;10(6):1397-415. doi:10.1093/tbm/ibaa118

4. Wechkunanukul K, Parajuli D, Hamiduzzaman M. Utilising digital health to improve medication-related quality of care for hypertensive patients: An integrative literature review. World J Clin Cases. 2020;8(11):2266-80. doi:10.12998/wjcc.v8.i11.2266

5. Sudarman, Dioso R, Harun Z, Che Hassan H. Interventions to Improve Medication Adherence in Hypertensive Patients: A Bibliometric Analysis. Malays J Nurs. 2024;16(S1):17-25. doi:10.31674/mjn.2024.v16isupp1.017

6. Etminani K, Engström AT, Göransson C, Sant'Anna A, Nowaczyk S. How Behavior Change Strategies are Used to Design Digital Interventions to Improve Medication Adherence and Blood Pressure Among Patients With Hypertension: Systematic Review. J Med Internet Res. 2020;22(4):e17201. doi:10.2196/17201

7. Sun T, Xu X, Ding Z, Xie H, Ma L, Zhang J, et al. Development of a Health Behavioral Digital Intervention for Patients With Hypertension Based on an Intelligent Health Promotion System and WeChat: Randomized Controlled Trial. JMIR Mhealth Uhealth. 2023;11(1):e53006. doi:10.2196/53006

8. Conway C, Kelechi T. Digital Health for Medication Adherence in Adult Diabetes or Hypertension: An Integrative Review. JMIR Diabetes. 2017;2(2):e8030. doi:10.2196/diabetes.8030

9. Yap HJ, Lim JJJ, Tan SYD, Ang CS. Effectiveness of digital health interventions on adherence and control of hypertension: a systematic review and meta-analysis. J Hypertens. 2024;42(6):987-1001. doi:10.1097/HJH.0000000000003793

10. Náfrádi L, Galimberti E, Nakamoto K, Schulz PJ. Intentional and Unintentional Medication Non-Adherence in Hypertension: The Role of Health Literacy, Empowerment and Medication Beliefs. J Public Health Res. 2016;5(3):762-8. doi:10.4081/jphr.2016.762

11. Chantzaras A, Yfantopoulos J. Determinants of medication adherence in patients with diabetes, hypertension, and hyperlipidemia. Hormones. 2025;24(1):125-35. doi:10.1007/s42000-025-00631-9

12. Kithuka PM, Kithuka BAN, Mekala E, Mutua IM, Idris A, Omondi EO. Health System Factors Influencing the Effectiveness of Mobile Phone Platforms in Promoting Treatment Compliance among Patients with Non-Communicable Diseases in LMICs: A Systematic Review. Int J Res Sci Innov. 2025;12(15):105-15. doi:10.51244/ijrsi.2025.1215000105

13. Márquez Contreras E, Márquez Rivero S, Rodríguez García E, López-García-Ramos L, Pastoriza Vilas JC, Baldonedo Suárez A, et al. Specific hypertension smartphone application to improve medication adherence in hypertension: a cluster-randomized trial. Curr Med Res Opin. 2018;35(1):167-73. doi:10.1080/03007995.2018.1549026

14. Tawpik NHNM, Mizher HAA, Zaini S. Mobile Application Intervention Effectiveness in Improving Hypertensive Patients Medication Adherence: A Systematic Review. J Pharm. 2025;5(1):45-55. doi:10.31436/jop.v5i1.286

15. Abu-El-Noor N, Aljeesh Y, Bottcher B, Abu-El-Noor MK. Impact of a mobile phone app on adherence to treatment regimens among hypertensive patients: A randomised clinical trial study. Eur J Cardiovasc Nurs. 2020;19(4):309-17. doi:10.1177/1474515120938235

16. Damodaran P. Digital Therapeutics For Hypertension Management: A Review. J Hypertens. 2024;42(Suppl 1):e35. doi:10.1097/01.hjh.0001063060.08360.02