

**RESEARCH PAPER****Effectiveness of E-Pharmacy Services in Managing Chronic Diseases in Rural Pakistan****<sup>1</sup>Shaista Naz, <sup>2</sup>Muhammad Ishtiaq, and <sup>3</sup>Kinza Riaz\***

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**\*Corresponding Author:** Kinza.riaz@student.potomac.edu**ABSTRACT**

Current study has assessed the effectiveness of e-Pharmacy services in chronic diseases management in rural Pakistan. E-pharmacy is playing an important role in supporting the existing healthcare infrastructure in Pakistan. However, the effectiveness of these services in rural areas and especially in chronic diseases management is largely unexplored. Therefore, the current study was designed to fill in the gap. A mixed-method approach was used and data were collected from 50 e-pharmacy users and 10 key informants. It was found that e-pharmacy has enhanced medication accessibility and adherence, particularly for the literate women aged 40-49 years. However, significant challenges persist, such as digital literacy, concerns over medication quality, and internet connectivity, impacting user satisfaction and effectiveness in chronic diseases management. Therefore, it is recommended that there is a need for digital literacy initiatives, strict regulations, user-friendly platforms, improved customer support, and infrastructure investment for the optimum e-pharmacy effectiveness in rural healthcare delivery.

**KEYWORDS** Barriers, Chronic Diseases, Diabetes, E-pharmacy, Hypertension, Rural Pakistan**Introduction**

Globally, e-pharmacies have revolutionized the healthcare industry and has demonstrated significant potential towards the medication adherence enhancement and improvement of overall patient outcomes (Johnson et al., 2023). These platforms offer medications, healthcare products and doctors' consultations (Kavathekar & Shah, 2021). In the developed countries like United States and Europe, e-pharmacy services contributed towards reduced hospitalizations and better management of chronic conditions and thus has significantly improved health outcomes (Smith et al., 2022; Johnson et al., 2023). In the case of chronic diseases management, these services offer increased accessibility and convenience (Smith et al., 2022).

The concept of e-pharmacy platforms is also introduced in the developing world where its importance is more evident for the improved health outcomes (Kavathekar et al., 2021). In various countries, the e-pharmacies are a good and affordable option for areas where transportation and healthcare infrastructure are weak (Kavathekar & Shah, 2021). Like other developing countries, in Pakistan, e-pharmacy services or platforms emerged due to the technological development and internet perception (Ahmad et al., 2021). Main aim behind these services are to provide potential support to the existing inadequate healthcare infrastructure (Ahmad et al., 2022). Moreover, these platforms ensure the provision of essential medicine to those in need or in areas where there is inadequate traditional pharmacy facilities (Alghurair et al., 2019).

In case of Pakistan, it is evident in the literature that in rural areas in comparison to urban areas possess weak healthcare infrastructure and there are even scarcity or non-

existence of traditional pharmacies (Jafar et al., 2023; Khan et al., 2022). So, the e-pharmacy has a potential market in the rural areas of the country to fill in the through the timely provision of medicines, healthcare products and even doctors' consultancies and thus improve patient outcomes (Li et al., 2020).

Despite the benefits of e-pharmacy, the implementation and effectiveness of these services has been remained largely under-explored. Similarly, the associated challenges towards the use of these services in rural areas are also important to be explored (Jafar et al., 2022). The literature provides a general overview of e-pharmacy services potential benefits like improved medication adherence and accessibility. Such as Khan et al. (2023) reported that e-pharmacy services in rural Pakistan has the potential for improved medication adherence through the reduced need of physical travel. However, there is a notable gap in comprehensive research regarding the quality of medications provided through e-pharmacy and the barriers faced by rural people specifically (Ahmed et al., 2023). In the case of diseases management like chronic ones through e-pharmacy services, there is a considerable gap in the literature (Smith et al., 2022; Wang et al., 2022).

The literature shows the gap related to the specific impact of e-pharmacy services on chronic disease management in rural Pakistan (Ahmed et al., 2023). Similarly, in the academic literature the specific barriers towards the use of e-pharmacy services in rural Pakistan is also not been fully explored (Hussain et al., 2023). Therefore, the current research study is designed to fill in the mentioned literature gap. Moreover, by focusing on chronic diseases like diabetes and hypertension, which are prevalent in rural areas (Wang et al., 2022), the research seeks to assess the effect of e-pharmacy on medication management and identify key barriers to its adoption. The findings of this study will contribute valuable insights for policymakers and service providers to improve e-pharmacy services and chronic disease management in the rural areas of the country. The current study 1) determines the effect of e-pharmacy services on the management of chronic diseases such as diabetes and hypertension in rural areas, 2) assesses the quality and reliability of medications delivered through e-pharmacy services, and 3) identifies the barriers to e-pharmacy adoption for chronic disease management.

## **Literature Review**

Globally, the role of e-pharmacy services in chronic disease management is well documented such as in United States and Europe it has been reported that e-pharmacy has the potential to significantly improve not only medication adherence but overall patient outcomes for chronic diseases (Jaffer et al., 2022). Smith et al. (2022) highlighted that e-pharmacy services are significantly linked with reduced hospitalizations and increased adherence of prescribed treatment. Similarly, Johnson et al. (2023) reported that increased accessibility and convenience through e-pharmacy has a positive impact on chronic disease management.

However, in the developing countries the situation is not well documented. In this context, Jafar et al. (2022) emphasized that there are substantial benefits of e-pharmacy in the developing countries, however various constraints like digital illiteracy and inadequate infrastructure affect its effectiveness in the low-resource settings. The study further reported that addressing these constraints are important for improved e-pharmacy services.

In Pakistan, rural healthcare infrastructure is inadequate and underdeveloped and prevalence of chronic diseases like hypertension and diabetes is high thus making its management challenging (Jafar et al., 2023; Khan et al., 2022). However, the emergence of e-pharmacy services provides a potential solution, to manage these diseases through access to medications and healthcare support in rural areas (Jafar et al., 2023). Similar to the context, Ahmed et al., (2023) also pointed out that e-pharmacy services are crucial for rural

areas due to the traditional and limited healthcare infrastructure (Ahmed et al., 2023). However, the effectiveness of e-pharmacy services in improving chronic disease management in rural Pakistan remains under-researched.

The available literature has largely focused on the potential benefits of e-pharmacy in enhancing medication accessibility and adherence. For instance, Khan et al. (2023) demonstrated that e-pharmacy services in the rural areas of Pakistan can offer improved medication adherence through reduced need of physical travel for chronic patients. Similarly, Ahmed et al., (2023) reflected that there is a lack of comprehensive research on the quality of medications provided through e-pharmacy and the specific barriers faced by rural users highlighting the need of such study.

The above-mentioned literature has provided valuable insights into the general benefits and challenges or barriers of e-pharmacy but has not provided any specific findings on the effects on chronic disease management in rural Pakistan. The studies of Smith et al. (2022) and Wang et al. (2022) has only focused developed countries, leaving a gap in understanding how e-pharmacy services affect medication adherence and quality in developing country context like in rural Pakistan. Furthermore, according to Hussain et al., (2023), the barriers or challenges in the Pakistani rural contexts like technical issues and digital illiteracy, have not been extensively explored in the literature leaving a considerable gap required to be filled. Therefore, the current research study is designed to fill in the required research gap and to contribute towards the inputs for more effective policy formulation and service design tailored to the needs of rural populations.

## **Methodology**

Current study investigates the role of e-pharmacy in chronic diseases management in rural Pakistan. The focus is on the two chronic diseases i.e. diabetes and hypertension. The first reason behind the selection of these two chronic diseases is associated with its high prevalence in rural areas (Khan et al., 2020; Jafar et al., 2021). The second reason is that there are risks of morbidity and mortality due to these chronic diseases (Wang et al., 2022). Third reason is that the rural areas of the country are disproportionately affected due to limited resources and healthcare access thus, highlighting the potential role of e-pharmacy services in the improved disease management and accessibility (Jafar et al., 2022). The study has adopted mixed method of research due to the nature if the study. Furthermore, mixed method of research has been extensively used in the literature, thus providing significant ground to be used in current study (Afridi et al., 2022; Naz et al., 2022a; Naz et al., 22b). Purposive sampling method was used and a sample of 50 e pharmacy rural users and 10 key informant interviewers (i.e. Pharmacists, researchers, and healthcare providers) was selected. Quantitative data were collected through a structured questionnaire. Questionnaire has been largely used in the literature as a data collection tool (Azam et al., 2022; Naz et al., 2021; Naz et al., 2018b; Zaidi et al., 2018). The questionnaire included questions related to the specific objectives of the study like use of e-pharmacy, management of chronic diseases, perceived effectiveness of the e-pharmacy services, medication adherence, and satisfaction with the e-pharmacy services. Five-point Likert scales like i.e. Strongly disagree, Agree, Neutral, Agree, Strongly Agree and Very dissatisfied, Satisfied, Neutral, Satisfied, Very Satisfied was used to record the data for the perception and satisfaction of the respondents towards e-pharmacy services, respectively. Data were collected from both the genders and from the willing respondents. The unwilling respondents were replaced with the willing ones (Naz et al., 2020; Naz et al., 2018a). The purpose of the research and data confidentiality and its use for the research purpose only, were explained to the respondents of the study (Naz et al., 2023c). Qualitative data were collected through key informant interviews from researchers of the same field, pharmacists and healthcare providers. The collected data were subjected to appropriate analytical techniques. For quantitative data, frequencies, percentages and descriptive statistics, while the qualitative data were entered in the respective software, coded and the patterns were

identified and themed through thematic analysis (Naz et al., 2024a; Naz et al., 2024b; Naz et al., 2023d). The derived results were tabulated and themed and presented in the following section of this research article.

## Results

Data in table 1 provides detail of demographic of the respondents of the study. It was found that 12%, 27%, 32%, 20%, and 08% of respondents were belong to the age groups of 18-29 years, 30-39 years, 40-49 years, 50-59 years, and 60 years and above, respectively. From the total respondents, 46% were male, while 54% were female. Similarly, 90% of the respondents were literate, while 10% were illiterate.

| Variable        | Frequency | Percentage |
|-----------------|-----------|------------|
| Age (in years)  |           |            |
| 18-29           | 06        | 12         |
| 30-39           | 13        | 27         |
| 40-49           | 16        | 32         |
| 50-59           | 10        | 20         |
| 60 and above    | 04        | 08         |
| Gender          |           |            |
| Male            | 23        | 46         |
| Female          | 27        | 54         |
| Literacy status |           |            |
| Literate        | 45        | 90         |
| Illiterate      | 05        | 10         |

**Table 1: Demographic information of the respondents**

## Chronic diseases managed through e-pharmacy services

Data in Table 2 show that 46%, 40%, and 14% of the respondents managed chronic diseases like hyper tension, diabetes, and both, respectively though the available e-pharmacy platforms.

| Disease      | Frequency | Percentage |
|--------------|-----------|------------|
| Hypertension | 23        | 46         |
| Diabetes     | 20        | 40         |
| Both         | 07        | 14         |
| Total        | 50        | 100        |

**Table 2: Chronic disease management**

## Use of e-pharmacy among the respondents

Table 3 presents data regarding the use of e-pharmacy services among the respondents of the study. It was reported that 56%, 26%, and 18% respondents were using e-pharmacy platforms of Dawai.pk, SehatKahani, and PakMedi, respectively for the management of their chronic diseases. Furthermore, 56%, 20%, and 24% of the respondents were ordering from these platforms from less than 6 months, 6 months to 1 year, and more than 1 year, respectively. From the total respondents, 52%, 22%, 04%, and 22% respondents are using these platforms for the delivery of medication monthly, quarterly, annually, and when required, respectively.

| Variable   | Frequency | Percentage |
|--|-----------|------------|
| The most used e-pharmacy platform                |           |            |
| Dawai.pk   | 28        | 56         |
| Sehat Kahani                                     | 13        | 26         |
| PakMedi  | 09        | 18         |
| e-pharmacy services use time period              |           |            |
| less than 6 months                               | 28        | 56         |
| 6 months to 1 year                               | 10        | 20         |
| Above 1 year                                     | 12        | 24         |
| Frequency of medication order through e-pharmacy |           |            |
| Monthly  | 26        | 52         |
| Quarterly  | 11        | 22         |
| Annually   | 02        | 04         |
| When required                                    | 11        | 22         |

**Table 3: Use of e-pharmacy**

### Effectiveness of e-pharmacy services

Table 4 presents data regarding effectiveness of e-pharmacy services in rural Pakistan. The effectiveness of these services was checked in the areas of convenience, medication quality, medication adherence, services reliability and customer support. It was found that 60%, 45%, 45%, 30%, and 30% of the respondents were agreed that e-pharmacy services offer convenience, medication quality, medication adherence, services reliability and customer support, respectively. however, 25%.25%, 35%, and 45% of the respondents were disagree towards medication quality, medication adherence, services reliability and customer support offered through e-pharmacy platforms.

| Variable             | Strongly disagree | Disagree | Neutral | Agree | Strongly agree |
|----------------------|-------------------|----------|---------|-------|----------------|
| Convenience          | --                | --       | 10      | 60    | 20             |
| Medication quality   | --                | 25       | 10      | 45    | 20             |
| Medication Adherence | --                | 25       | --      | 45    | 30             |
| Services reliability | --                | 35       | --      | 30    | 35             |
| Customer support     | --                | 45       | --      | 30    | 25             |

**Table 4: Effectiveness of e-pharmacy services (%)**

### Barriers in the use of e-pharmacy services

Data in table 5 show that 8%, 40%, 18% and 34% of the respondents reported technical problems, internet connectivity issues, medication quality, and digital literacy, respectively as barriers while using the various e-pharmacy services for their chronic diseases' management through these platforms.

| Variable                     | Frequency | Percentage |
|------------------------------|-----------|------------|
| Technical problems           | 04        | 08         |
| Internet connectivity issues | 20        | 40         |
| Medication quality           | 09        | 18         |
| Digital illiteracy           | 17        | 34         |
| Total                        | 50        | 100        |

**Table 5: Barriers in the use of e-pharmacy services**

### Satisfaction from e-pharmacy services

Table 6 reflects data related to satisfaction of the respondents from e-pharmacy services to manage their chronic diseases. It is revealed that from service delivery, customer support, and medication quality 30%, 10%, and 30% respondents were satisfied, respectively, while 10%, 10%, and 15% respondents were very satisfied in terms of service delivery, customer support, and medication quality from the e-pharmacy services, respectively. Out of total respondents, 40% and 10% respondents were satisfied and very satisfied in terms of service delivery, customer support, and medication quality from the e-pharmacy services, respectively.

| Variable             | Very dissatisfied | dissatisfied | Neutral | Satisfied | Very satisfied |
|----------------------|-------------------|--------------|---------|-----------|----------------|
| Service delivery     | 5                 | 15           | 35      | 35        | 10             |
| Customer support     | 10                | 20           | 30      | 10        | 10             |
| Medication quality   | 12                | 18           | 25      | 30        | 15             |
| Overall satisfaction | 08                | 12           | 30      | 40        | 10             |

**Table 6: Satisfaction from e-pharmacy services (%)**

Thematic analysis on the challenges to e-pharmacy services in chronic disease management in rural Pakistan has resulted in to various themes presented as follow;

### **Convenience and Accessibility**

E-pharmacy services has revolutionized healthcare industry and its role in chronic disease management is now also visible in the remote settings. Respondents of the study reported that these services have enhanced accessibility to medications in the remote rural areas where there is scarcity of healthcare facilities. Convenience and accessibility are the two main factors behind the use of these services which has reduced long travel distances to acquire medications. Healthcare providers were of the view that

“E-pharmacy has made it much easier for people to get their medications without the need of travel. The chronic diseases require regular medications and thus through these services”.

Pharmacists and researchers were of the view that "The convenience of ordering medicines from home through e-pharmacy is invaluable in rural areas where even traditional pharmacies are very much limited."

### **Medicines' Quality and Reliability**

There are concerns about the quality and reliability of medications delivered through e-pharmacy services in rural areas of the country. Healthcare providers and researchers were of the view that in the country, there are no strict adherence to quality controls and especially in virtual market therefore, the issues of quality of medicines encountered by rural people. Similarly, the issue of counterfeit drugs also exists (Pharmacists) which further create a mistrust among the end users about these e-pharmacy services in the country. The patients of diabetes and hypertension using these services for their medications may face the issues of counterfeit drugs which can adversely affect their health outcomes (Healthcare Providers).

The existence of regulatory oversight results in crucial concerns about medicines' quality and reliability distributed through e-pharmacy services in the rural areas (Researchers).

### **Technological issues**

Rural areas tend to have low levels of literacy and formal education along with the little advancements in technology. Even the various remote areas of the country have limited or lack of internet connectivity (Researchers) which poses significant challenges to the adoption of e-pharmacy services (Pharmacists, Researchers and Healthcare Providers). The inadequate internet inception and low speed further limit these resource constrained areas to manage chronic diseases. Rural people with diabetes and hypertension has to make frequent orders to manage their chronic diseases and they must have to access to appropriate technologies as well along with a user-friendly interface (Researchers).

### **Lack of digital literacy**

The rural people are mostly uneducated and there are high rates of illiteracy prevails in these areas as well. The low levels of formal education result in the low rates of digital literacy among these people. The low or lack of digital illiteracy further hinders the use of e-pharmacy platforms for the chronic disease management (Researcher and Healthcare Providers). The online services require some kind of digital literacy, while rural people in general are not digitally literate so some concrete measures are required for the adoption of e-pharmacy services for managing chronic diseases (Pharmacists).

### **Effectiveness and Satisfaction**

The users' satisfaction with e-pharmacy services and their perceived effectiveness in managing chronic diseases are important for the overall adoption of these services for better health outcomes. In this regard, the researchers were of the view that those who are using these services for their chronic diseases in the rural areas like the service due to the convenience and increased accessibility, however the issues of counterfeit goods and low support for customer care in case of wrong deliveries exists which affect the effectiveness and satisfaction. The similar facts were endorsed by the pharmacists and healthcare providers. They further added that the weak regulatory bodies in the country and lack implementation of customer supporting laws overall affect the satisfaction and effectiveness of e-pharmacy services in the rural areas.

Researchers were of the view that for the remote rural areas, the delivery services (i.e. courier services) are not available thus these services cannot be effectively used for the management of chronic diseases.

### **Discussion**

Current study assessed the effectiveness of e-pharmacy services in chronic diseases management (i.e. hypertension and diabetes) in the rural areas of Pakistan. The study was focused on the effect of e-pharmacy services on chronic diseases management, the medication quality and adherence through these services and the challenges towards the use of these services. Current study revealed that e-pharmacy services in the study area present a transformative opportunity for chronic disease management through its potential for improvements in medication access and adherence. However, the study also underscores the various challenges associated with the use of these services which limits its wide range use. These services have been used by both the genders male and female covering all age groups. However, female respondents were more utilizing these services than male and the age group of 49 to 50 years were more active in the use of these services. It is due to the fact that in this age group hypertension and diabetes are more common. The more use of e-pharmacy services among women reflects gender differences in health-seeking behaviors and access to healthcare in the country (Jaffer et al., 2023). Additionally, the higher engagement of individuals in the age group of 40-49 years is consistent with the higher prevalence of chronic diseases such as hypertension and diabetes in this age group as depicted in the literature (Jafar et al., 2021). Furthermore, the use of e-pharmacy services is linked with overall literacy status. The current study showed that 90% of the respondents

were literate so the use of these services requires literacy and then digital literacy as well (Hussain et al., 2023). The most common e-pharmacy platforms used by respondents the study was Dawai.pk, SehatKahani, and Pakmedi. However, majority of the respondents were using Dawai.pk. Majority of the respondents were using these platforms from the last 6 months. Similarly, majority of the respondents were using for their monthly medications order these platforms. These platforms were mostly used for the two chronic diseases hypertension and diabetes.

The effectiveness of e-pharmacy services in the chronic disease management was linked to the various benefits or advantages offered by these platforms for the rural people. In this regard, convenience and accessibility were the most significant advantages offered by these platforms as depicted by 60% of the respondents. The findings are in line with the study conducted by Smith et al. (2022) where it was emphasized that e-pharmacy services in the developed countries have significantly improved patient adherence and reduced hospitalizations through their easier access to medications. Another study conducted by Jafar et al., (2023) also confirmed that rural people need e-pharmacy platforms or services for increased accessibility because traditional healthcare infrastructure is very weak over there (Jafar et al., 2023). These services enabled people to order online their medications thus the need for long travel as a major barrier to healthcare access in these areas was subsided (Khan et al., 2022).

Despite the convenience and increased accessibility offered by e-pharmacy platforms, there are significant concerns regarding the quality and reliability of medications. Out of the total respondents, 25% expressed their dissatisfaction with medication quality. Similar findings have been observed in the available literature such as Jafar et al. (2022) highlighted the issue of counterfeit drugs and substandard medications of the online services are related to the inadequate regulatory oversight in developing countries. In the case of Pakistan, the lack of effective quality control measures exaggerates these issues, thus making it crucial to improve the regulatory frameworks and implement robust quality assurance processes for better health outcomes (Hussain et al., 2023). These improvements are further essential in the case of chronic diseases management because substandard medications directly affect patient outcomes (Wang et al., 2022).

Technical barriers and digital illiteracy are prominent challenges identified in the study. Approximately 34% of respondents cited digital illiteracy as a barrier, which is consistent with the findings of Ahmed et al. (2023), who reported that low digital literacy levels hinder the effective use of e-pharmacy services in developing countries. The study also highlighted problems with internet connectivity, which affects e-pharmacy adoption and usage. According to Khan et al. (2023), inadequate internet infrastructure in rural Pakistan limits the effectiveness of online healthcare solutions. Additionally, low levels of digital literacy further impede the adoption of e-pharmacy services in the country (Hussain et al., 2023).

In the case of user satisfaction with e-pharmacy services, only 30% of the respondents expressed their satisfaction with medication quality and customer support. These findings are in line with the findings of Johnson et al. (2023), who reported that although e-pharmacies offered convenience and accessibility, however there are gaps in the service quality and customer support. Further the current study also reported the concerns of counterfeit drugs through e-pharmacy. Previous literature also highlighted that there is a need of improved customer support and regulatory measures to increase customer satisfaction from e-pharmacy services (Smith et al., 2022).

## **Conclusion**

The current study has assessed the effectiveness of e-pharmacy services for chronic diseases management in rural Pakistan. The study concluded that these services provides



the transformative potential, however there are certain substantial challenges towards its use to manage the chronic diseases like diabetes and hypertension. The most common e-pharmacy platforms used by respondents in the study were Dawai.pk, SehatKahani, and Pakmedi. However, the former platform was used by majority of the respondents. The use of these services are due to the associated benefits like enhanced medication access and improved adherence. Similarly, convenience and accessibility have been emerged as major advantages of these services while addressing the barrier of long travel to healthcare facilities. These services are mostly used by the literate, women and in the 40-49 years age group which reflect the higher prevalence of chronic diseases in this demographic and its effectiveness for these respondents. However, there are also certain challenges which further hinder the effectiveness and user satisfaction of e-pharmacy services. These challenges include medication quality, digital illiteracy, and internet connectivity. Major portion of the respondents and thematic analysis in the study highlighted that dissatisfaction is associated with medication quality and customer support. Moreover, the prevalence of low levels of digital literacy and inadequate internet infrastructure further complicate not only the widespread adoption of e-pharmacy services in rural areas but also poses challenges for the existent users. Addressing of these challenges are important for improved health outcomes in the study area.

### **Recommendations**

For the improved effectiveness of e-pharmacy services in rural Pakistan, the following recommendations are made.

1. The dissatisfaction and issue of counterfeit drugs through e-pharmacy platforms in the rural areas of the country can severely affect the chronic diseases management affecting health outcomes. Therefore, the strict regulatory measures by the concerned institutes are required.
2. Low levels of digital literacy are a challenge in the adoption and use of e-pharmacy platforms in rural Pakistan. Therefore, the digital literacy campaigns by public and private partnerships are important in improving digital literacy among the rural people of the country.
3. User friendly interfaces including simplified navigation and multilingual support are suggested for the e-pharmacy platforms to accommodate rural people with varying levels of digital literacy.
4. There is a need of investment in the infrastructure development like internet penetration and connectivity, so that the e-pharmacy platforms may be used by masses in rural areas for their chronic diseases.
5. Customer support services must be improved by the e-pharmacy platforms through the incorporation of hotlines, chat support, and in-app messaging. It will address user queries and issues promptly and thus the effectiveness of these platforms in chronic diseases management in rural areas will be improved as well.

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