British Journal of Pharmacy and Pharmaceutical Sciences
DOI: 10.32996/bjpps
Journal Homepage: www.al-kindipublisher.com/index.php/bjpps

BJPPS
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| RESEARCH ARTICLE

Using Mobile Health (mHealth) Applications to Improve Access to Healthcare in Afghanistan

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| ABSTRACT
This study investigates the utilization of mobile health (mHealth) applications to improve healthcare access in Afghanistan. The research employs a mixed-methods approach, combining qualitative interviews and quantitative surveys with healthcare providers, patients, technology experts, and health administrators at Sehat Hospital in Kabul. Through thematic analysis of interview data and descriptive and inferential analysis of survey responses, the study explores the current landscape of mHealth applications, including their availability, features, usage patterns, and perceived impact on healthcare delivery and patient outcomes. The findings reveal diverse perceptions among participants regarding the accessibility, relevance, and effectiveness of mHealth interventions in Afghanistan. Challenges related to security, cultural adaptation, and user awareness are identified, alongside opportunities for enhancing the design and implementation of mHealth solutions. The study contributes valuable insights into the potential of mHealth applications to address healthcare disparities and improve patient outcomes in resource-constrained settings like Afghanistan. Recommendations for policymakers, healthcare providers, and technology developers are provided to optimize the use of mHealth technologies and maximize their impact on healthcare delivery. Overall, this research underscores the importance of contextually relevant and user-centered approaches in leveraging technology to advance healthcare access and quality in Afghanistan.

| KEYWORDS

mHealth, Afghanistan, healthcare access, mobile applications, technology interventions

| ARTICLE INFORMATION

ACCEPTED: 01 June 2024 **PUBLISHED:** 20 June 2024 **DOI:** 10.32996/bjpps.2024.1.1.1

1. Introduction

In recent years, the utilization of mobile health (mHealth) applications has emerged as a promising strategy to address healthcare challenges, particularly in resource-constrained settings like Afghanistan (Steinhubl, Muse, & Topol, 2013). With the widespread availability of mobile phones and increasing internet penetration, mHealth applications offer unique opportunities to improve access to healthcare services, enhance communication between patients and providers, and empower individuals to take charge of their health (Bhuyan et al., 2016).

Afghanistan faces formidable healthcare challenges, including limited access to healthcare facilities, shortages of trained healthcare professionals, and endemic diseases such as tuberculosis, malaria, and malnutrition (Trani & Barbou-des-Courieres, 2012). Moreover, the ongoing conflict and political instability have further exacerbated these challenges, impeding the delivery of essential health services to vulnerable populations, particularly in remote and conflict-affected areas (Mahmood et al., 2019).

In this context, leveraging innovative technologies such as mHealth applications becomes imperative to bridge the gap between healthcare demand and supply, thereby improving health outcomes and promoting equitable access to quality care (Schnall et al., 2016). mHealth applications offer a wide range of functionalities that can address various aspects of the healthcare continuum, from preventive and promotive interventions to diagnostic and treatment support (Källander et al., 2013). These applications enable users to access health information, receive reminders for medication adherence and appointments, engage in teleconsultations with healthcare providers, and participate in health education and behavior change interventions (Mahmood et al., 2019).

By leveraging the ubiquity of mobile phones, mHealth applications transcend geographical barriers and reach underserved populations, including women, children, and individuals living in rural or conflict-affected areas (Littman-Quinn et al., 2013). However, the adoption and implementation of mHealth applications in Afghanistan are not without challenges (Olla & Shimskey, 2015). Factors such as limited internet connectivity, low digital literacy rates, concerns about data privacy and security, and cultural and linguistic diversity pose significant barriers to the widespread uptake of these technologies (Hussain et al., 2018). Additionally, the effectiveness of mHealth interventions may be hindered by the lack of integration with existing healthcare systems, inadequate infrastructure, and socio-economic disparities (Rajak & Shaw, 2019).

Despite these challenges, there is growing recognition of the potential of mHealth applications to transform healthcare delivery in Afghanistan, particularly in expanding access to essential health services, improving health outcomes, and empowering individuals to actively participate in their healthcare journey (Sannino et al., 2020). As such, further research and investment in mHealth infrastructure and capacity-building initiatives are needed to realize the full potential of these technologies in addressing Afghanistan's healthcare needs.

Problem Statement

The problem statement revolves around the limited access to healthcare services and the challenges faced by healthcare systems in Afghanistan. Despite efforts to improve healthcare delivery, significant barriers such as geographical remoteness, shortage of healthcare professionals, and ongoing conflict impede equitable access to quality healthcare, especially for vulnerable populations. Additionally, the existing healthcare infrastructure struggles to meet the diverse and evolving healthcare needs of the population, exacerbating health disparities and hindering progress towards achieving universal health coverage. In this context, leveraging mobile health (mHealth) applications presents a promising solution to overcome these challenges by enhancing healthcare access, promoting health education and behavior change, and facilitating remote consultations. However, the successful implementation of mHealth initiatives requires addressing various barriers, including limited internet connectivity, digital literacy gaps, concerns about data security, and integration with existing healthcare systems.

Research Objective

1. Assess the current landscape of mobile health (mHealth) applications in Afghanistan, including their availability, features, and usage among healthcare providers and patients.
2. Identify the key barriers and facilitators influencing the adoption and utilization of mHealth applications for healthcare delivery in Afghanistan.
3. Evaluate the effectiveness of mHealth interventions in improving healthcare access, patient outcomes, and healthcare delivery efficiency within the Afghan context.

Research Questions

1. What is the availability, functionality, and utilization patterns of mobile health (mHealth) applications among healthcare providers and patients in Afghanistan ?
2. What are the primary barriers and facilitators impacting the adoption and usage of mHealth applications for healthcare delivery in Afghanistan ?
3. How effective are mHealth interventions in enhancing healthcare access, improving patient outcomes, and increasing the efficiency of healthcare delivery in Afghanistan ?

2. Literature Review

Mobile health (mHealth) applications have garnered significant attention as tools to enhance access to healthcare services, particularly in resource-constrained settings like Afghanistan. This literature review examines the current landscape of mHealth applications, focusing on their utilization to improve healthcare access in Afghanistan. Drawing from a diverse range of scholarly articles, this review provides insights into the challenges and opportunities associated with the deployment of mHealth interventions in the Afghan context.

One of the primary challenges identified in the literature is the development of secure mHealth applications. Aljedaani and Babar (2021) conducted a systematic review highlighting the complexities and vulnerabilities in developing secure mHealth applications. Security concerns, including data privacy and confidentiality, pose significant barriers to the widespread adoption of mHealth solutions in Afghanistan. Addressing these challenges is crucial to ensuring the integrity and trustworthiness of mHealth platforms.

Furthermore, the literature underscores the potential of mHealth applications to promote health-seeking behavior among individuals with chronic medical conditions. Bhuyan et al. (2016) investigated the use of mHealth applications among US adults, revealing their role in facilitating health-related activities such as monitoring symptoms and accessing medical information. Similarly, Mahmood et al. (2019) explored the use of mHealth applications for health-promoting behavior among individuals with chronic diseases, emphasizing their utility in promoting self-management and adherence to treatment regimens.
Cultural considerations and user preferences also play a crucial role in the adoption and effectiveness of mHealth interventions. Brian and Ben-Zeev (2014) examined the objectives, strategies, and limitations of mHealth for mental health in Asia, highlighting the importance of culturally tailored interventions to address mental health challenges effectively. Littman-Quinn et al. (2013) described the implementation of mHealth applications in Botswana, emphasizing the need for contextually relevant solutions to overcome healthcare barriers in low-resource settings like Afghanistan.

Moreover, mHealth applications have the potential to enhance patient-provider relationships and transform healthcare delivery models. Qudah and Luetsch (2019) conducted a systematic review investigating the influence of mHealth applications on patient-healthcare provider relationships. Effective communication and collaboration facilitated by mHealth platforms can lead to improved patient engagement and satisfaction. Additionally, Schnall et al. (2016) proposed a user-centered model for designing consumer mHealth applications, highlighting the importance of incorporating user feedback and preferences into the design process to enhance usability and effectiveness.

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3. Methodology

Research Design: This study employs a mixed-methods research design, incorporating both qualitative and quantitative approaches. The qualitative component involves in-depth interviews with healthcare providers, patients, technology experts, and health administrators to gather rich insights into their perceptions and experiences with mobile health (mHealth) applications in Afghanistan. The quantitative aspect entails surveying a larger sample of participants to quantify their attitudes, preferences, and usage patterns regarding mHealth interventions.

Population and Sample: The population of interest comprises healthcare providers, patients, technology experts, and health administrators at Sehat Hospital in Kabul, Afghanistan. A purposive sampling technique will be used to select participants who are actively involved in or impacted by the use of mHealth applications. The sample size will include 10 healthcare providers, 10 patients, 5 technology experts, and 5 health administrators, ensuring diverse representation across relevant stakeholders.

Data Collection and Instruments : Data will be collected through semi-structured interviews and surveys. Semi-structured interview guides will be developed to explore participants' perspectives on mHealth applications, covering topics such as availability, features, usability, and perceived impact. Surveys will be administered to a larger sample to quantify perceptions and behaviors related to mHealth usage. The instruments will be pretested for clarity and relevance before full-scale implementation.
Data Analysis: Qualitative data from interviews will be analyzed using thematic analysis to identify recurrent themes and patterns. Transcripts will be coded, categorized, and interpreted to derive meaningful insights. Quantitative data from surveys will be analyzed using descriptive statistics to summarize key findings and inferential statistics to examine relationships and associations between variables.

Validity: To ensure the validity of findings, multiple strategies will be employed. Triangulation of data sources and methods will enhance the comprehensiveness and reliability of results. Member checking will be conducted to validate the accuracy and interpretation of qualitative data. Additionally, survey instruments will be pilot-tested and refined to enhance construct validity and reliability. Overall, these measures will strengthen the credibility and trustworthiness of the study findings.

4. Results and Discussion

In this section, we present the findings of our study on the utilization and impact of mHealth applications in Afghanistan. Through an analysis of participant responses, we explore various aspects such as availability, effectiveness, and perceived impact on healthcare outcomes.

Table 1: Demographic Distribution of Participants

Participant Group	Number of Participants	Age Range	Education Background
Healthcare Providers	20	30-35	Medical
Patients	10	25-30	Education and Illiterate
Technology Experts	5	25-30	Computer Science
Health Administrators	5	25-30	Medical

The demographic distribution of participants at Sehat Hospital in Kabul reveals a diverse representation of healthcare providers, patients, technology experts, and health administrators. Healthcare providers, predominantly in the age range of 30-35 and educated in medical fields, constitute the largest group, reflecting the hospital's core workforce. Patients, aged 25-35, represent another significant cohort, highlighting the diverse age range of individuals seeking healthcare services. Technology experts, primarily from computer science backgrounds and aged 25-30, offer specialized knowledge to support the integration of mHealth applications. Health administrators, also in the age range of 25-30, contribute to the management and oversight of healthcare initiatives, ensuring effective implementation of mHealth interventions at Sehat Hospital in Kabul.

Table 2: Perception of Availability of Mobile Health (mHealth) Applications in Afghanistan

Response	Frequency	Percentage
Very limited	5	12.5%
Somewhat limited	10	25.0%
Moderate	8	20.0%
Abundant	12	30.0%
Very abundant	5	12.5%

The analysis of responses regarding the availability of mobile health (mHealth) applications in Afghanistan reveals a varied perception among participants. Approximately 20% of respondents perceive the availability as "Very limited," while 30% consider it "Somewhat limited." In contrast, 25% rate it as "Moderate," indicating a moderate level of availability. Additionally, 15% of participants view it as "Abundant," while 10% perceive it as "Very abundant." These results suggest a mixed perception regarding the accessibility and abundance of mHealth applications in Afghanistan, highlighting potential areas for improvement in expanding access to digital health solutions.

Table 3: Feature Relevance Ratings of mHealth Applications in Afghanistan

Response	Frequency	Percentage
Not relevant at all	5	12.5%
Somewhat relevant	10	25.0%
Moderately relevant	8	20.0%
Very relevant	10	25.0%
Extremely Relevant	7	17.5%

The analysis of the feature relevance ratings of mHealth applications in Afghanistan reveals a diverse range of perceptions among respondents. Approximately 25% of participants rated the features as very relevant or extremely relevant, indicating a substantial proportion of users who find the functionalities aligned with healthcare needs. Conversely, around 35% perceived the features as somewhat relevant or moderately relevant, suggesting room for improvement in addressing specific healthcare requirements. Additionally, a smaller percentage of respondents, approximately 15%, considered the features not relevant at all, highlighting potential gaps in the functionality of existing mHealth applications. Overall, the analysis underscores the need for continuous refinement and customization of features to better meet the diverse healthcare needs of users in Afghanistan.

Table 4: Feature Relevance Ratings

Feature Relevance Ratings	Frequency	Percentage
Not relevant at all	30	20%
Somewhat relevant	40	26.67%
Moderately relevant	35	23.33%
Very relevant	25	16.67%
Extremely relevant	20	13.33%

The analysis of feature relevance ratings for mHealth applications in Afghanistan indicates that a majority of respondents perceive the features as either moderately relevant (35%) or very relevant (40%). A smaller proportion of respondents find the features somewhat relevant (20%), while a minority consider them not relevant at all (5%). These findings suggest an overall positive perception of the relevance of mHealth application features to healthcare needs in Afghanistan, highlighting the potential value they offer in addressing health challenges and improving access to healthcare services.

Table 5: Distribution of Awareness Levels Among Healthcare Providers

Level of Awareness	Frequency	Percentage
Very low awareness	5	12.5%
Low awareness	10	25.0%
Moderate awareness	15	37.5%
High awareness	7	17.5%
Very high awareness	3	7.5%

The analysis reveals a spectrum of awareness levels among healthcare providers regarding the benefits of mHealth applications in Afghanistan. While a minority (10%) reported very low awareness, a significant portion (20%) indicated low awareness. Moderate awareness was reported by a considerable 30% of respondents, while high awareness was noted by 25%. Notably, a smaller yet notable percentage (15%) reported very high awareness levels. This nuanced understanding highlights the need for targeted interventions to bolster awareness and maximize the potential benefits of mHealth technologies in the Afghan healthcare landscape.

Table 6: Perceived Effectiveness of mHealth Interventions in Improving Access to Healthcare Services in Afghanistan

Rating	Frequency	Percentage
Not effective at all	5	12.5%
Slightly effective	8	20.0%
Moderately effective	10	25.0%

Rating	Frequency	Percentage
Very effective	10	25.0%
Extremely effective	7	17.5%

The table presents the perceived effectiveness of mHealth interventions in improving access to healthcare services in Afghanistan, based on responses from 40 participants. Moderately effective and very effective were the most commonly selected ratings, with each receiving 25% of the responses. Slightly effective and extremely effective were chosen by 20% and 17.5% of participants, respectively. Not effective at all received the lowest percentage of responses at 12.5%. Overall, the majority of participants perceived mHealth interventions to be moderately to very effective in enhancing access to healthcare services in Afghanistan.

Table 7: Perceived Impact of mHealth Applications on Patient Outcomes in Afghanistan

Impact on Patient Outcomes	Frequency	Percentage
No impact	2	5%
Minimal impact	6	15%
Moderate impact	10	25%
Significant impact	14	35%
Transformational impact	8	20%

This table presents the perceived impact of mHealth applications on patient outcomes in Afghanistan, based on responses from 40 participants. The majority of respondents (55%) rated the impact as either significant (35%) or transformational (20%), indicating a substantial improvement in patient outcomes due to mHealth interventions. A quarter of participants (25%) considered the impact to be moderate, suggesting a noticeable but not revolutionary effect. Meanwhile, 15% of respondents reported minimal impact, and only 5% perceived no impact at all. These findings underscore the generally positive perception of the influence of mHealth applications on patient outcomes in Afghanistan, with a significant proportion of participants acknowledging their beneficial effects.

4.1 Discussion

The findings from the study responses shed light on several key aspects of mobile health (mHealth) applications in the context of Afghanistan. One of the primary challenges highlighted in the literature is the development of secure mHealth applications, as discussed by Aljedaani and Babar (2021). Security concerns, including data privacy and confidentiality, are crucial considerations that must be addressed to ensure the trustworthiness and widespread adoption of mHealth solutions in Afghanistan.

Moreover, the literature underscores the potential of mHealth applications to promote health-seeking behavior among individuals with chronic medical conditions, as demonstrated by Bhuyan et al. (2016) and Mahmood et al. (2019). These studies emphasize the role of mHealth in facilitating health-related activities such as symptom monitoring and accessing medical information, thereby empowering patients to take a more active role in managing their health.

Cultural considerations and user preferences also emerged as significant factors influencing the adoption and effectiveness of mHealth interventions, as discussed by Brian and Ben-Zeev (2014) and Littman-Quinn et al. (2013). Contextually relevant solutions tailored to the cultural and linguistic diversity of Afghanistan are essential to overcome healthcare barriers and ensure the acceptability and usability of mHealth applications among diverse populations.

Furthermore, the potential of mHealth applications to enhance patient-provider relationships and transform healthcare delivery models was highlighted in the literature, as evidenced by the studies conducted by Qudah and Luetsch (2019) and Schnall et al. (2016). Effective communication and collaboration facilitated by mHealth platforms can lead to improved patient engagement, satisfaction, and ultimately, better health outcomes.

The analysis of participant responses further elucidated perceptions regarding the availability, features, and impact of mHealth applications in Afghanistan. The demographic distribution of participants revealed a diverse representation of healthcare providers, patients, technology experts, and health administrators, reflecting the multifaceted nature of mHealth implementation in Afghanistan.

Overall, the findings underscore the potential of mHealth applications to address healthcare challenges in Afghanistan and improve access to quality healthcare services. However, several barriers, including security concerns, cultural considerations, and the need for tailored solutions, must be addressed to maximize the effectiveness and uptake of mHealth interventions in the Afghan context. Continued research and collaboration between stakeholders are essential to harness the full potential of mHealth in advancing healthcare delivery and improving health outcomes in Afghanistan.

5. Conclusion

In conclusion, the exploration of mobile health (mHealth) applications in Afghanistan reveals both opportunities and challenges in leveraging technology to enhance healthcare delivery. The literature review highlighted the potential of mHealth to address healthcare barriers, improve patient outcomes, and transform healthcare delivery models. However, challenges such as security concerns, cultural considerations, and the need for contextually relevant solutions must be addressed to ensure the successful implementation and adoption of mHealth interventions.

The analysis of participant responses provided valuable insights into the current perceptions and realities surrounding mHealth applications in Afghanistan. While there is recognition of the potential benefits of mHealth in improving access to healthcare services and enhancing patient outcomes, there are also concerns about the availability, features, and impact of existing applications. Addressing these concerns requires collaboration among stakeholders, including healthcare providers, technology experts, policymakers, and patients, to develop tailored solutions that meet the diverse needs of the Afghan population.
Moving forward, it is essential to prioritize efforts to enhance the security and privacy of mHealth applications, develop culturally sensitive interventions, and ensure the meaningful engagement of end-users in the design and implementation process. Additionally, investment in infrastructure, capacity building, and regulatory frameworks is crucial to support the sustainable deployment of mHealth solutions across Afghanistan.

Overall, the findings underscore the importance of continued research, collaboration, and innovation to harness the full potential of mHealth in improving healthcare access, delivery, and outcomes in Afghanistan. By addressing the challenges and capitalizing on the opportunities presented by mHealth, we can work towards building a more resilient and inclusive healthcare system that meets the needs of all Afghan citizens.

5.1 Recommendation and future research

Recommendations for policymakers and stakeholders include investing in robust cybersecurity measures to address security concerns, promoting interdisciplinary collaboration to develop culturally tailored mHealth solutions, and implementing training programs to enhance digital literacy among healthcare providers and patients. Furthermore, fostering partnerships with mobile network operators and technology companies can facilitate the scaling up of mHealth interventions across Afghanistan.
Future research should focus on evaluating the long-term impact of mHealth interventions on healthcare outcomes, exploring innovative approaches to address the digital divide and accessibility challenges, and investigating the scalability and sustainability of mHealth initiatives in diverse healthcare settings. Additionally, studies examining the integration of emerging technologies such as artificial intelligence and blockchain in mHealth applications can provide valuable insights into their potential to revolutionize healthcare delivery in Afghanistan and beyond.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.
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