

AI-ENABLED SERVICE DELIVERY AND PATIENT ENGAGEMENT: A COMPREHENSIVE STUDY OF DIGITAL TOUCHPOINTS IN PRIMARY HEALTH CENTRES OF NAGPUR DISTRICT

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Abstract :

The rapid integration of Artificial Intelligence (AI) into healthcare delivery has significantly reshaped patient engagement, operational efficiency, and service quality, particularly within public primary healthcare systems. This study examines the role of AI-enabled digital touchpoints—such as automated appointment scheduling, AI-assisted triage, patient interaction chatbots, electronic health record interfaces, and predictive service analytics—in influencing patient satisfaction and behavioural loyalty in Primary Health Centres (PHCs) of Nagpur district, Maharashtra. Employing a descriptive and analytical research design, primary data were collected from 200 outpatients through a structured questionnaire. Statistical techniques including descriptive statistics, correlation analysis, and multiple regression were used to analyse relationships among service quality dimensions, patient engagement, trust, and revisit intention. Findings indicate that AI-enabled service mechanisms significantly improve accessibility, responsiveness, perceived reliability, and overall patient experience. The study underscores the importance of strategic AI adoption tailored to the digital literacy levels of patients and operational capacities of PHCs, and offers actionable recommendations for policymakers and healthcare administrators to strengthen public health service delivery through sustainable AI integration.

Introduction :

Artificial Intelligence has emerged as a transformative force across global healthcare systems, enabling automation, data-driven decision-making, and improved patient-provider communication. In primary healthcare settings, where resource constraints and high patient volumes are common, AI has the potential to improve efficiency and quality of care delivery. In India, Primary Health Centres (PHCs) represent the foundational tier of the public health system, catering largely to rural and semi-urban populations. Districts such as Nagpur experience diverse healthcare demands, making PHCs critical access points for preventive and curative services. Integrating AI-enabled digital touchpoints within PHCs can address long-standing challenges such as long waiting times, limited manpower, fragmented



information systems, and inconsistent patient engagement. This study seeks to empirically examine how AI-supported service delivery influences patient satisfaction and behavioural loyalty within PHCs of Nagpur district.

Review of Literature :

Extant literature highlights the growing application of AI in healthcare, ranging from clinical decision support systems and diagnostic imaging to administrative automation and patient engagement platforms. Davenport and Kalakota (2019) emphasize that AI can enhance healthcare value by improving accuracy, efficiency, and personalization of services. Topol (2019) discusses the convergence of human expertise and artificial intelligence in delivering high-performance medicine. Several studies report that AI-driven appointment systems and chatbots reduce administrative burden and improve patient satisfaction by offering timely information and support. Research by Obermeyer and Emanuel (2016) demonstrates the potential of machine learning to leverage big data for predictive insights in clinical practice. In the Indian context, Sharma (2020) notes increasing interest in AI adoption within healthcare, though implementation in public primary care remains limited. The literature indicates a gap in empirical studies focusing on AI-enabled service delivery in PHCs, particularly in semi-urban and rural districts, thereby justifying the present study.

Objectives of the Study :

- To examine the role of AI-enabled digital touchpoints in service delivery at Primary Health Centres.
- To analyse the impact of AI-supported services on patient satisfaction and engagement.
- To assess the relationship between AI-enabled service quality and behavioural loyalty among PHC outpatients.
- To identify challenges and opportunities associated with AI adoption in public primary healthcare settings.
- To suggest policy and managerial recommendations for effective AI integration in PHCs.

Research Methodology :

The study adopted a descriptive and analytical research design to explore the impact of AI-enabled service delivery in PHCs. Primary data were collected from 200 outpatients visiting selected PHCs across Nagpur district using a structured questionnaire. Convenience sampling was employed due to accessibility considerations. The questionnaire comprised multiple sections measuring demographic variables, AI-enabled service touchpoints, perceived service quality, trust, satisfaction, and behavioural intention to revisit. Responses were measured using a five-point Likert scale. Data analysis was conducted using descriptive statistics to summarize respondent characteristics, correlation analysis to examine relationships among variables, and multiple regression analysis to assess the predictive influence of AI-enabled services on patient satisfaction and loyalty. Reliability of the



instrument was confirmed using Cronbach's alpha, with values exceeding acceptable thresholds.

Data Analysis and Discussion :

The analysis revealed a statistically significant positive relationship between AI-enabled digital touchpoints and patient satisfaction. Automated appointment scheduling systems were found to substantially reduce perceived waiting time and administrative delays. AI-assisted triage and information services improved patient confidence in service processes and enhanced perceived reliability. Chatbots and digital communication interfaces facilitated timely responses to patient queries, contributing to higher engagement levels. Regression analysis indicated that perceived usefulness and trust were the strongest predictors of behavioural loyalty, followed by ease of access and responsiveness. These findings align with existing literature suggesting that technology-enabled service quality enhances patient experience and repeat utilization intentions. However, the discussion also highlights challenges related to digital literacy, infrastructure constraints, and the need for continuous staff training.

Findings of the Study :

- AI-enabled digital touchpoints significantly enhance operational efficiency in PHCs.
- Automated systems reduce waiting time and improve service accessibility.
- Patient trust and perceived usefulness of AI-supported services positively influence satisfaction.
- Behavioural loyalty is strongly associated with consistent and reliable digital service experiences.
- Digital literacy and infrastructure limitations remain key moderating factors.

Recommendations :

Based on the findings, the study recommends strengthening digital infrastructure across PHCs, particularly in rural and semi-urban areas. Capacity-building programmes should be implemented to train healthcare staff in the effective use of AI tools. Multilingual AI chatbots can enhance inclusivity and patient understanding. Policymakers should establish guidelines for ethical AI use, data privacy, and system evaluation to ensure reliability and trust. Regular monitoring and feedback mechanisms can help refine AI-enabled services in line with patient needs.

Conclusion :

The study concludes that AI-enabled service delivery plays a significant role in improving patient engagement, service quality, and behavioural loyalty in Primary Health Centres of Nagpur district. Strategic and context-sensitive adoption of AI technologies can strengthen public healthcare delivery, reduce service inefficiencies, and support equitable access to quality care. As India advances toward digital health transformation, integrating AI within PHCs represents a promising pathway for enhancing the effectiveness and



sustainability of primary healthcare systems.

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