A Study on Digital Transformation for Enhancing Cancer Prevention, Early Detection, and Care Among Women

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Introduction

- Cancer remains one of the leading causes of death worldwide, contributing to nearly 10 million deaths annually, according to the World Health Organization.
- Factors contributing to high mortality in these regions include delayed diagnosis, poor access to health services, inadequate infrastructure, and limited awareness of early signs and symptoms.
- In India, cancers of the breast, cervix, and oral cavity constitute a significant proportion of the cancer burden.
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- mHealth tools can drive awareness and increase screening uptake; telemedicine can provide remote access to oncologists; AI algorithms can assist in early diagnosis by interpreting images; and EHRs can ensure continuity of care.
- India has made commendable progress in deploying digital platforms for cancer control, especially post-2016 under the National Digital Health Mission and the mCessation program.
- The purpose of this study is to evaluate how digital transformation has contributed to improving cancer prevention, early detection, and treatment between 2001 and 2021, with a specific focus on India and relevant global evidence.

Aim

The study aims to explore both the potential and the limitations of digital interventions in the oncology landscape, through a review of relevant literature and a mixed-methods research design i.e to evaluate how digital transformation has contributed to improving cancer prevention, early detection, and treatment between 2001 and 2021, with a specific focus on India and relevant global evidence.

Problem statement

- This study addresses the critical challenge of late-stage cancer diagnosis and inadequate care accessibility in India by evaluating how digital health technologies—such as mHealth, telemedicine, and AI—can transform cancer prevention, early detection, and treatment, recognizing the urgent need to bridge the gap between promising digital innovations and their real-world implementation to enhance health equity, efficiency, and outcomes in oncology care.
- It provides evidence-based insights into how digital tools can bridge existing gaps in India's cancer care system, inform health policy decisions, and guide the scaling of effective, equitable, and sustainable digital health interventions, especially in low-resource and underserved settings.

Objectives

To identify the types and scope of digital tools (e.g., mHealth, telemedicine, AI-based screening, EMRs) used in cancer prevention and care for women.

To explore the perspectives of key stakeholders (patients, healthcare providers, program managers) on facilitators and barriers to digital transformation in women’s cancer care.

To provide policy and programmatic recommendations for scaling effective digital health innovations in cancer control for women.

Methodology

- **Research Design:** Narrative integrative literature review design
- **Study Setting**: A structured review of global and national literature sourced from peer-reviewed journals, grey literature, and reports from healthcare agencies. Databases used include PubMed, ScienceDirect, and Google Scholar.
- **Study Population**: The population of interest includes published research studies, intervention reports, and digital health models focused on cancer prevention, early detection, and patient-centered care.
- **Sampling Technique**: Purposive Sampling
- **Sample Size**: Out of an initial pool of 932 articles retrieved through keyword searches, 37 relevant studies were included after screening and eliminating duplicates and non-relevant works.

Results

Thematic Summary of Reviewed Literature

Theme	Key Outcome	Supporting Study
Accessibility	2x increase in rural cancer screening with CHW-led mHealth models	Biruretal. (2019), Venkatesan et al. (2016)
Technological Integration	AI improved detection sensitivity; RTLS reduced follow-up delay	McKinney et al. (2020), eLAJ (Biocon, 2021)
Community Engagement	Awareness up from 10% to 85% via video education in rural Bihar	Sinha & Sharma (2024)
Operational Efficiency	30% drop in chemo errors; increased survival by 5 months	Pradhan et al. (2020), Basch et al. (2017)

Key Insights

- The study demonstrated that digital transformation tools—particularly mobile health (mHealth), artificial intelligence (AI), telemedicine, and real-time location systems (RTLS)—have had a substantial positive impact on accessibility, awareness, diagnostic efficiency, and clinical outcomes in cancer care.
- The reviewed studies show that mHealth strategies, such as mobile-based symptom monitoring and reminders, significantly increased adherence to screening and treatment protocols.
- Artificial intelligence has also emerged as a transformative force in early detection. The integration of AI not only enhances diagnostic accuracy but also compensates for the scarcity of specialists in rural or remote locations.
- The implementation of real-time data platforms and telemedicine during the COVID-19 pandemic underscored the relevance of distributed cancer care models.
- . These tools have improved access to screening services, enabled better coordination among healthcare providers, and contributed to patient-centered care models.

Conclusion

- Enhanced Accessibility: mHealth applications facilitated outreach in underserved areas, improving community participation in cancer screening programs.
- Technological Advancement: AI-based platforms enabled early detection of cancers such as oral, breast, and prostate by enhancing diagnostic accuracy and speed.
- Decentralized Cancer Care: Digital platforms supported community-based screening and training of frontline health workers, reducing the burden on tertiary hospitals.
- Improved Patient Engagement: SMS alerts, mobile applications, and teleconsultations encouraged adherence to treatment regimens and improved the overall patient experience.

References

- Chamber TB. PWC Report: Reimagining the possible in the Indian healthcare ecosystem with emerging technologies. 2018.
- Langberg EM, Dyhr L, Davidsen AS. Development of the concept of patient-centredness – A systematic review. Patient Education and Counseling. 2019;102(7):1228-36
- Chapman CJ, Murray A, McElveen JE, Sahin U, Luxemburger U, Türeci Ö, et al. Autoantibodies in lung cancer: possibilities for early detection and subsequent cure. Thorax. 2008;63(3):228-33.
- Chapman CJ, Murray A, McElveen JE, Sahin U, Luxemburger U, Türeci Ö, et al. Autoantibodies in lung cancer: possibilities for early detection and subsequent cure. Thorax. 2008;63(3):228-33.
- Ghosh S. Does mobile telephony spur growth? Evidence from Indian states. Telecommunications Policy. 2016;40(10):1020-31.